

amateur radio

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Two months' notice is required before a change
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State of residence; in addition, "A.R." should
also be notified. A convenient form is pro-
vided in the "Call Book".

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COVER STORY

Pictured on our front cover is a PC board of a typical Slow-Scan
TV Monitor complete less CRT and EHT supply. Note ICs are used
throughout. See S.S.T.V. article on page 3.

NEW LOOK IN ADMINISTRATION: E.D.P.

This New Year marks yet another step forward in Institute affairs. During last year, as decided at the 1971 Convention in Brisbane, the entire membership details were programmed into computer files to serve three primary and numerous secondary functions.

The three primary objectives are:—

Preparation of subscription notices;
Constantly updated mailing lists for "A.R.";

Australian Call Book printing data.

The first of these has been achieved as all members should already have received their notices for subscriptions due for the year 1972. The second is imminently in operation and the third is partly a function of the material now held being merely the "pressing of a button" to obtain within minutes a print out of the necessary details after feeding in the missing data.

It is equally important, as a corollary, to observe that the data now on file can only be amended or added to BY EACH DIVISION in respect of the members of that Division. Carefully conceived security checks have been devised to ensure that this continues. It is also necessary to assure members that whatever levies are deducted for Federal activities can only be done by the agreement of Divisions and then only at a Federal Convention under normal conditions.

I am glad at this stage to acknowledge the enormous debt of gratitude owed by the Institute to Dr. Deane Blackman, VK3TX, for conceiving and organising the entire project. Without his help, which has also given us considerable savings compared with commercial operations, the old muddles would have continued in certain areas of application.

To programme the details of the membership has required a number of compromises to comply with the objectives on the one hand and the inherent limitations on the other. For some Divisions the detail appears too great, to others too restricted. In certain areas the programme does not admit of infinite variation.

With these points in mind the existing financial arrangements had to be fitted into the system. VK2, VK4 and VK5 Divisions operate a subscription year running from March in one year to February of the next year. VK7 Division is in process now of changing over to the calendar year. VK3 and VK6 are already on a calendar year basis (January to December). Sub-

scription rates in VK2 and VK6 were recently increased and certain revisions were carried out in another Division.

In the Federal field, the I.A.R.U. dues were on a calendar year basis but the per capita fee was still on the March-February year. "Amateur Radio" itself, by agreement at the last Convention, is scheduled for early transfer to Federal Executive from the VK3 Division. At the last Convention the annual Federal per capita fee from 1/1/72 was increased from 55c per member to \$3.35 for each Full and Associate grade of member to pay for the administration costs of the Federal office.

Resulting from all these variants, it was necessary to programme the computer with amounts equivalent to ten-twelfths of the annual subscription rates for each of the Divisions on a March-February year, full subscription rates on the others; a full year of the per capita fees less two-twelfths of the amount already paid and ten-twelfths of the costs of "A.R."

This was by prior agreement with the Divisions and results in all the Institute subscriptions, fees, dues and levies for the 1972 year concluding on 31st December, 1972. Most of the Divisions, as a matter of practical application, have ended their financial year on this date and it is, therefore, convenient that all the financial arrangements now fit the calendar year.

As a result of these considerations the members of some Divisions will have noticed that their subscription rates appeared peculiar (being 10/12ths of the annual rate) and others will have observed unusual rates of Federal deductions (again 10/12ths in most instances). Due to various teething troubles and because we could not afford to run two systems in parallel, two errors crept into the programme which resulted in an erroneous grand total on each notice and description errors in the sub-divisions of "fees." Both had to be corrected by hand unfortunately.

In the past, subscriptions have been paid to Divisional offices. From these amounts have derived the Federal contributions paid over to Federal Executive in lump sums by each Division. In the new system all subscriptions are required to be sent direct to Federal Executive where they will be accounted for with Divisions at frequent intervals and through the computer to tally-in with the previously programmed data. Although the accounting load on the Federal office will be considerably enhanced, it is hoped that a modern

accounting system will readily cope with the demands made on it. Delays along the line will occur when members make or send payments to their Divisions. Receipts will not be issued unless specially requested by the sender so it will be desirable whenever possible to pay by crossed cheque made out to "W.I.A." or "Wireless Institute".

What else does all this mean? The centralisation of subscriptions and the processing through E.D.P. of address changes and other alterations will relieve Divisions of a tremendous volume of work normally done by hard working volunteers. Several Divisions have commented that the preparation of the E.D.P. material has unveiled hitherto unsuspected areas of confusion and error.

Even now, errors may occur either by reason of inevitable and unavoidable communications delays or through normal human inaccuracies. Although the computer is deemed to be exact in its work, data has to be transcribed for the input and the nature of the data must comply with fixed specifications in the programme. Mistakes do occur in both these areas, but the percentage error is low. All these mistakes have to be found and have to be corrected. Sometimes yet another error arises whilst correcting a mistake. One example met with was changing a member's initials which had originally been incorrectly inserted. The correction brought out the correct initials, but in the process the member's name and title were erased. These had to be resurrected but in this process the member's serial number was incorrect with the result that the whole of the member's details had to be re-submitted and we began again at square one. Fortunately, such examples are very, very few in number but are time-consuming to rectify.

The whole of this operation is a collective effort in co-operation by a great many people so, if you do find an error in your subscription notice, please tell or write to the Federal Manager about it. Every possible precaution has been taken to ensure correctness and completeness, but in any new undertaking various difficulties always seem to arise despite the best endeavours to avoid them.

Two concluding thoughts. One is to wish you and yours all you wish yourself in the year ahead, and the second is to ask your continued support for the Institute and the Amateur Cause in every possible way.

—MICHAEL J. OWEN, VK3KI,
Federal President, W.I.A.

SLOW-SCAN TELEVISION—THE AUSTRALIAN WAY

J. A. WILSON, VK3LM,* and A. H. McKIBBIN,† VK3YEO

Have you ever wanted to respond to the call "CO Slow-Scan, CO Slow-Scan, W6 — — calling"? Or have you ever heard a variety of audio tones being transmitted on h.f. and wonder what is going on? It could be a CO call being transmitted in video form but, alas, you can't answer it. Do you want to know more? Then please read on.

SLOW-SCAN TELEVISION (s.s.t.v.) presents an intrigue that is rapidly growing in popularity within the Amateur fraternity. While maintaining all of the DX potential available to conventional s.s.b. transmission, it adds the facility of instantly transmitting picture information in the equivalent audio bandwidth used for voice transmission. Additionally, the pictures may be tape-recorded on a conventional audio tape-recorder and played back any time.

The delightful feeling on first becoming acquainted with the h.f. communications seems to repeat itself with the potential of slow-scan where both activity and DX contacts are a reality.

One of the first items needed to begin in this field is a slow-scan monitor, about which more information will be presented later.

S.s.t.v. earns its name from a scanning rate that is much slower than conventional t.v. In order to use a conventional t.v. camera for s.s.t.v., the horizontal and vertical sweep circuits would have to be modified for the slower sweep frequencies. Another method by which s.s.t.v. pictures can be produced is by means of a flying-spot scanner. Here you cannot transmit live action, but must rely on a slide, negative or photograph which is scanned by a dot of light being produced by a fast-moving electron beam of a c.r.t. focused on to the slide, negative or picture. The light, either passing through the slide or alternatively being reflected from the photograph, modulates a photo-multiplier tube. This video information is combined with vertical and horizontal sync. signals which modulate a conventional Amateur transmitter via the microphone input.

S.S.T.V. SYSTEM USED TODAY

An s.s.t.v. signal is a 1.5 kHz. tone which is shifted down to 1.2 kHz. for sync. information, and modulated upwards to 2.3 kHz. for picture information (video information). The 1.5 kHz. represents the black level and 2.3 kHz. is the white, with tones in between giving shades of grey. The 1.5-2.3 kHz. shift is similar to facsimile and possibly receiving converters could be used on either mode.

A 5-m.s. burst of 1.2 kHz. tone gives the horizontal sync. pulse, while a 30-m.s. pulse of 1.2 kHz. is used for the vertical sync. (see Fig. 2). A horizontal sweep rate of 15 Hz. and a vertical sweep rate of either 7.2 seconds or 8

seconds results in a horizontal resolution of 120 lines. It should be noted by the way that none of these standards is critical.

Although the idea of s.s.t.v. was widely circulated in the late 1950s, the first serious Amateur experiments took place in 1967 when a group of State-side Amateurs was given permission by the F.C.C. to explore the feasibility of s.s.t.v. on 10 metres. The experiments were a success, and in August 1968, the F.C.C. announced frequency allocations for U.S. Amateurs.

In Australia, we are permitted to transmit s.s.t.v. on any authorised

Amateur band provided the bandwidth does not exceed that of an a.m. station, e.g. 6 kHz.

Many users of the v.h.f. nets in Melbourne may have heard the woeful tones of s.s.t.v. being transmitted over either 52.525 MHz. f.m. net or Channel B 2 metre f.m. net from time to time and have wondered just what is going on.

Since an f.m. type signal is used for sending the information, the receiving monitors can have a good deal of limiting built in, thus making the system relatively immune to interference from voice signals in adjacent channels.

One of the major benefits of any f.m. system is the "capture" effect, which permits the dominant signal to come through easily but reduces or eliminates the effect of the others.

During early experiments, a.m. was used and it was found that by this method, the pictures were greatly degraded after passing over long distances by noise, fading and adjacent-channel interference.

STANDARDISATION

The standardisation question has two sides to it. On the one hand, the man who is thinking of building equipment desires a measure of assurance that his equipment will not be obsolete as soon as it is built. On the other hand, in the long-range picture, it would be a shame to settle for less than the best possible system—the



Photo of Jim KIMEA/4 taken from monitor of VK3YEO. Signal strength less than 51. Noise and fading seen on the picture, also lack of horiz. sync. Recorded on Bigaton Cassette Recorder C120 at 1 1/2 in/sec. Receiver FT200, tri-band beam TH3x, 40 ft. at VK3BFT (C.T.C. club station), operator was John VK3LM.

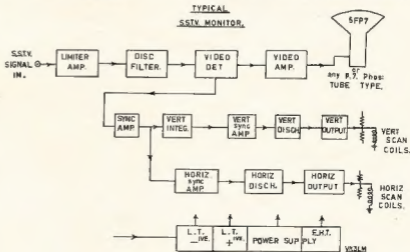


FIG. 1.

* 14 Merrilong Street, Ringwood East, Vic., 3113.
† 27 Beverley Street, East Doncaster, Vic., 3109.

"best" in this case being the optimum compromise between many factors. The system at the moment follows the following guide-lines:—

1. It utilises existing transmitting and receiving apparatus in the Amateur station and this equipment requires no modification at all (e.g. a.m., s.s.b. or f.m. modes).

2. The system can use simple equipment involving moderate cost and readily available components.

3. The system performance is good using simple equipment and by using more sophisticated equipment, it is possible to obtain extremely good results under very poor conditions.

4. The system must be compatible with both 50 and 60 Hz. power frequencies to permit world-wide operation as American circuits are designed to lock to the 60 Hz. mains supply.

Perhaps we in Australia could improve on s.t.v. standards as the Federal Executive has stated that they are willing to accept recommendations to suit Australian and overseas standards.

For example, here in Australia 50 Hz. mains supplies are evident. We could utilise this for the Australian system and increase the horizontal resolution to say 150 lines per frame or even more. Therefore our monitors would be capable of both 50 and 60 Hz. systems. What are your views on this?

At the present time, it is known that about 500 Amateurs throughout U.S.A., England, Sweden, New Zealand and Australia are active on s.t.v.

In Australia, Eric VK6ES is probably the pioneer of s.t.v. and has been active for several years. The following is a list of known Amateurs who, at the time of printing, are either active or in the process of building s.t.v. gear:

W.A.—Eric VK6ES

S.A.—Max VK5MF

Vic.—John VK3LM/T, Ringwood E.
George VK3NU, Burwood
Stan VK3TE, Elwood
Wally VK3ABM, Toorak
Kevin VK3ARD, Mt. Waverley
Neville VK3YDR, Rosanna
Mac VK3YEO, Doncaster East

Other States—activity not known.

HORIZ. SYNC PULSE



5 ms.
burst.

FIG. 2.

VERTICAL SYNC
PULSE

20 ms. burst



Fig. 4.—Picture taken from a commercial monitor of U.S. origin and readers should observe the picture-cushion effect that occurs on most 25-inch tubes today.

TRANSMISSIONS

Transmissions take place mainly on 14.230 MHz. in the 20 metre band, ± 8 kHz. should the channel be already in use.

In VK3, the co-authors (Mac VK3YEO and John VK3LM/T) have been handling pictures on 52.525 MHz. 6 metre f.m. and occasionally on Channel B 2 metre f.m. At a later stage, we would like to establish a v.h.f. slow-scanners frequency where experiments and video traffic could be transmitted without interference to other station modes.

With s.t.v., we transmit individual pictures rather than movies as in conventional t.v. A long persistence c.r. tube with a P7 phosphor is used so that the image will remain long enough on the screen during the scanning period of the information. Pictures can then be photographed with either conventional or "polaroid" cameras. QSL cards could be made showing the actual picture received from the transmitting station. Alternatively, audio tape QSLs could be exchanged.

Pictures can be received and recorded on standard $\frac{1}{4}$ " audio tape on a reasonably good quality tape recorder at a speed of 3 $\frac{1}{2}$ " per second. Alternatively,

a good quality "Philips-type cassette" recorder at 1 $\frac{1}{2}$ " per second can be used. The basic requirement of the recorder is to have a low wow and flutter rate, otherwise the pictures will have wavy edges due to recorder speed variation similar to horizontal "pulling" seen on some commercial fast-scan t.v. receivers. Good success has been had recording pictures on a cassette recorder.

PROPOSED S.S.T.V. SPECIFICATIONS

Australia—Not to exceed the bandwidth of d.s.b. = 6 kHz.

1. S.s.b. normal bandwidth = 3 kHz.

2. S.s.t.v. = 2.3 kHz.

3. Tone = 1500 Hz.

(a) Shifted between 1200 Hz. for sync. information.

(b) Modulated upwards 2300 Hz. for picture information.

e.g. 1500 Hz. = black level

2300 Hz. = white level

Tones in between =

shades of grey.

5-m.s. burst of 1200 Hz. = horizontal sync.

30-m.s. burst of 1200 Hz. = vertical sync.

4. Horizontal sweep rate = 60 Hz. supply = 15 Hz.

Horizontal sweep rate = 50 Hz. supply = 10.66 Hz.

5. Vertical sweep rate = 60 Hz. supply = 8 secs.

Vertical sweep rate = 50 Hz. supply = 7.2 secs.

6. Resultant resolution of 120 lines per frame.

7. Picture size: Approx. 4 $\frac{1}{2}$ " sq. Format 1:1.

8. Direction of scan (50 and 60 Hz. supply):

Horizontal—left to right.

Vertical—top to bottom.

Above as per International and Australian.

INTERNATIONAL S.S.T.V. (NET) FREQUENCIES

(VK Amateurs should note that the 80 and 40 metre frequencies are outside the Australian frequency allocations and thus cannot be used for transmitting purposes.)

80 metres = 3845 kHz.

40 metres = 7200 kHz.

20 metres = 14230 kHz.

Other frequencies are in use from time to time on 21 and 28 MHz.

SUGGESTED AUSTRALIAN (NET) FREQUENCIES

80 metres = 3.650 MHz.

40 metres = 7.125 MHz.

20 metres = 14.230 MHz.

6 metres = 52.6 MHz.

2 metres = 144.675 MHz.

—Draft prepared by J. Wilson, VK3LM/T.

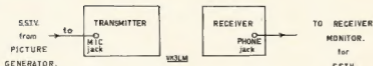


FIG. 3.

RECEIVING THE PICTURE

Receiver tuning is carried out in the normal way as for receiving an s.s.b. signal, but slightly more care in tuning is desirable (see Fig. 3). When off-tuned on s.s.b. the pitch of the voice will be either higher or lower than natural voice resonances because of the tuning error that exists; in a.s.t.v. the above fault would cause incorrect contrast, resulting in the picture being either greyer or blacker than normal.

EQUIPMENT

The monitor (see Fig. 1) is basically the first functional requirement of a.s.t.v. as anyone can become involved in receiving the pictures to keep abreast of current activity. In fact, you can have an entire video programme recorded on tape, plus the monitor and you can then take part in two-way involvement with slow-scan.

The first major requirement for monitor construction is to obtain a 5, 6 or 7 inch c.r. tube with a P7 long persistence phosphor. Although many of these tubes have been available via disposal sources, supplies are quickly drying up. Some units, such as Indicator type 101 or Indicator 101/109 16089 ex Albertos contained a CV1650 tube and a very sensitive deflection yoke with line drive assembly. This meant that a lot of the mechanical construction was already done. The CV1650 is a 6" English tube giving reasonably good picture detail.

Those who may be lucky enough to have a 5FP7 tube in the junk box will have the king of the disposal tubes as these give sharp brilliant pictures with about 6 kv. applied to its anode. In fact, any P7 type phosphor tubes can be used and should you have a suitable tube, it can be re-gunned and re-phosphored for P7 at reasonable prices from picture tube re-tuning establishments in the various States.

One of the larger picture tube manufacturers here in Australia (name supplied—Ed.) will make a new tube, any size to your own specification, for approximately \$5 more than the normal trade price for a one-off production.

Due to the 120-line resolution, picture size is rather small, being about 4½" square format received on a 6" diameter tube. Larger pictures can be received but they become like a very coarse newspaper photo.

Shown elsewhere is an un-retouched photo taken from a commercial monitor 4½" square format. Note the scan pin-cushion effect that occurs similar to the problem seen on most 25" tubes today (see Fig. 4).

The electronics for the rest of the monitor is rather conventional and can be built with almost any type of electronic components to suit the valve man, transistor man or IC king. Shown is a block diagram of a typical solid state monitor (Fig. 1).

First the deflection system will probably be magnetic and the best coils found were those from the old 70" Bush Simpson or early Classic 70" yokes. Focus can also be obtained by use of the magnetic assemblies obtained from old t.v.s using the above yokes.

A simple monitor consists of several limiter amplifiers, a discriminator, sync. and video detectors, video amplifier and display c.r. tube. The sync. separator is followed by a one-shot multivibrator (mono-stable) discharge circuits and deflection circuits. A power supply provides different potentials of plus and minus 10 volts or so with the common being at earth potential and e.h.t. supply to suit the type of c.r. tube used.

At this stage, no attempt has been made to publish a constructional article on a a.s.t.v. monitor as it has been found that most Amateurs prefer to use bits and pieces found on hand and to select sections of circuits from various articles to suit their own needs.

A very sophisticated circuit was received from Mike Tallant, W6MXV, who can supply PC boards, ICs, etc., on a commercial basis to Amateurs throughout the world. A photograph on the front cover shows how the entire monitor is constructed on two printed circuit boards, one being approximately 6" square containing all the limiter, sync., video amp. circuits, etc., and the second board approximately 6" x 3" containing the high and low voltage regulated supplies. Interested people requiring more information on these boards could write direct to Mike Tallant, W6MXV (ex W9HWX) at 2843 Maylen Way, San Jose, California, 95133, U.S.A.



Call of ZLIAOY received by John VIGLM (white letters on black background) on FT250. Strength S8, noise-free picture. Sync. pulling seen on picture. Taken from monitor of Mac VK3YEO.

An article that has appeared enabling Amateurs to become active with smaller equipment outlays is "Slow Scan TV Adaptor for Oscilloscopes" by Bill Briles, W7FEN, published in "QST," June 1970, pages 46-50.

At the conclusion of this article is a list of references where interested people in all aspects and development of slow-scan can obtain information and build up a file of all known published records to date.

Some commercial gear is available State-side for about \$US1,200. This includes both monitor and camera and is marketed under the name of "Robot". The only other commercial unit made is built by a one-man firm operated by W2EKY and the monitor is known as the "Eky". The do-it-yourself kit sells for about \$US300 with PC boards available for \$US10.

PICTURE TRANSMISSION

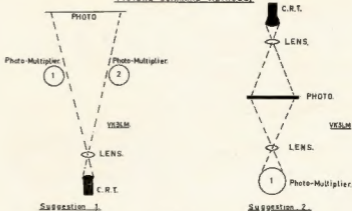
The first requirement of picture transmission is to satisfactorily scan the slide, photograph or negative in a light-tight box. Two methods of achieving this are shown in Fig. 6. Suggestion 1 shows the reflective method of scan, where the photograph is scanned directly by the c.r.t. and the reflection picked up by the photo-multiplier tubes (usually 931As, etc.).

In suggestion 2, direct scanning methods are tackled. Here the image must be either a transparency or a negative, as the light must pass through the image to reach the photo-multiplier. A very simple way to get going by this method is to use a 35 mm. slide projector where all optics and slide mechanisms are provided. All that is required is to remove the projector lamp from the lamp house and insert a photo-multiplier tube. The c.r.t., usually a 3FP7 tube, can be mounted a suitable distance in front of the objective lens. The above is then assembled in a light-tight box and connected to the rest of the electronics.

A typical block diagram of a slow-scan television picture generator is shown in Fig. 7. Here the c.r.t. scanning is achieved by the usual vertical and horizontal deflection circuits (note

FLYING SPOT SCANNERS.

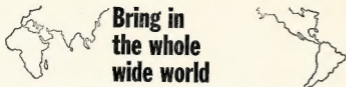
PICTURE SCANNING METHODS.



Suggestion 1.

Suggestion 2.

FIG. 6.



REALISTICALLY

with the

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the 3FP7 is an electrostatic tube). Output from the photo-multiplier is fed to the modulator then on to the sub-carrier oscillator where output is then taken to the transmitter phone jack as audio out.

Connection to the transmitter is simply by insertion directly into the microphone jack (see Fig. 3) where correct levels are set by the microphone gain control on the transmitter to obtain normal transmitter operation. Of course, should closed circuit pictures be required then the output of the scanner would be fed directly into the monitor input jack.

As can be seen, equipment is not outside the reach of the enthusiastic Amateur. Construction and layouts are not critical. With care and proper construction techniques, excellent results should be obtained.

Included in this article are photographs taken from pictures received from Ian ZLIAOY on 14290 kHz. on 1" audio tape, or a Bigten Cassette recorder and fed into a monitor constructed by Mac VK3YEO. The photographs were taken with a Leica camera fitted with a bellows and mounted 5" from a 3FP7 tube. Readers should note that these photographs are early results and picture quality should improve as the equipment is further perfected. In U.S.A., some Amateurs are starting to develop s.s.t.v. in colour, so the enthusiast should prepare for the future.

PARTS AVAILABILITY

Most of the components used are readily available from most radio parts suppliers throughout the Commonwealth. The most difficult parts to obtain are the P7 phosphor tubes. During the latter years, many P7 tubes were available via several disposal sources. Ham Radio Supplies had 40 indicator units complete with h.v. power supplies and a 6" tube. During the last couple of months, these units have been bought by prospective s.s.t.v. operators. However, Ken Milbourn of Ham Radio Supplies, 104 Highbury Street, Richmond, Vic., has in stock fifty 3FP7 new tubes suitable for either small monitors or flying spot scanners. The price is \$2 direct or plus packing and posting should this be required.

Ken also has in stock at the time of writing, several 3FP7 tubes mounted in shields with filter fitted to the screen face. These are available for \$5 complete direct, or plus packing and postage should this method of delivery be preferred.

As mentioned earlier in this article, if you have suitable 5" or 6" tubes, these can be re-gunned and re-phosphored at any t.v. re-gunning manufacturer. However, new tubes (8", 11" or 12") can be supplied made to your specifications with P7 phosphor in a one-off unit (name and address supplied—Ed.). The price of the tube will be trade price plus \$5 for the special order. Delivery is approximately two weeks from receipt of order.

Deflection yokes and other components will depend on the type of c.r.t. used. If electrostatic tubes are used, then no deflection components are required. As stated previously, suitable early type t.v. deflection coils can be

obtained from obsolete television receivers.

For the flying spot scanners, photo-multipliers such as type 931A have been plentiful through normal disposal sources.

This about winds up our first article on Slow-Scan Television—the Australian Way. Included in the insert are detailed proposed specifications of s.s.t.v. in Australia with a list of proposed net frequencies of operation for Australia. You will note that some of the American frequencies are not suitable for transmitting in Australia as these are outside our operating frequencies.

We would like to know how you feel about s.s.t.v.; are you interested in forming an s.s.t.v. club? Do the proposed frequencies suggested pose any problems within your particular State? All communications on the subject should be sent to either of the authors whose addresses are given elsewhere in the article.

Further results and developments will be published in "Amateur Radio" in the near future.

Listed below is a reference of all known articles published on s.s.t.v. for those people wishing to obtain more

information on the subject or propose to compile a comprehensive folder on s.s.t.v.

LIST OF KNOWN PUBLISHED INFORMATION ON S.S.T.V.

- "A Solid State S.S.T.V. Monitor," W9LUO, "QST," March 1971.
- "A Compact Slow-Scan Monitor," WA2BCW, "QST," March 1964.
- "A Slow-Scan Television Signal Generator," K7VZZ, "73 Mag.," July 1968.
- "A Slow-Scan Television Picture Generator," K7VZZ, "73 Mag.," Oct. 1967.
- "Conversion Post-Scan to Slow-Scan Television," W7Y2C, "Ham Radio," July 1971.
- "Narrow Band Image Transmission" (two parts), W4ZII, "QST," Aug. Sept. 1968.
- "Magnetic Deflection for S.S.T.V.," WB2IV, "73 Mag.," Feb. 1971.
- "An S.S.T.V. Patch Box," W4UMF, "73 Mag.," Feb. 1971.
- "A Slow-Scan Videon Camera (three parts)," WA2BCW, "QST," June, July, Aug. 1968.
- "An S.C.F.M. System of S.S.T.V.," WA2BCW (two parts), "QST," Jan., Feb. 1961.
- "Slow-Scan with Regular Videon," WA2EMC, "QST," Feb. 1963.
- "S.S.T.V. Budget Television for Hams," W7NSD, "Electronics IL," July 1971.
- "Slow-Scan T.V. Viewing Adapter for Oscilloscopes," W7FEW, "QST," June 1970.
- "Slow-Scan Image Transmission—A Progress Report," WA2BCW, "QST," April 1969.
- "Twenty Metre Slow-Scan Tests," "QST," June 1969.

(Continued on Page 16)



Picture: CO call by Jim K1MEA/4 (white on black), photographed from monitor of VK3YEO. Signal strength less than 51. Noise level and interference heavy. Note adjacent channel interference seen on the picture, also signal QSB at the bottom of the picture.

SLOW-SCAN TELEVISION (S.S.T.V.) CLUB

We would like to hear from all Amateurs and S.W.'s interested in SLOW-SCAN, and who would be interested in forming a Slow-Scan Group in VK. It is hoped that active participation in s.s.t.v. on both h.f. and v.h.f. in VK will result.

All interested Amateurs may contact either VK3LM/T, John A. Wilson, 14 Merrilong St., Ringwood East, Vic. 3135 (phone 870-5132) or VK3YEO, A. H. (Mac) McKibbin, 27 Beverley St., East Doncaster, Vic., 3109 (phone 842-1411).

BLOCK DIAGRAM OF AN S.S.T.V. PICTURE GENERATOR

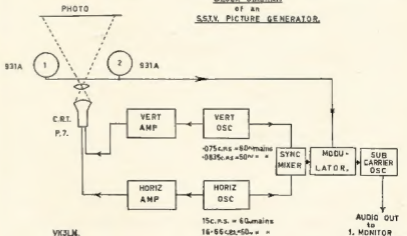


FIG. 2

A V.H.F. 25-WATT POWER AMPLIFIER

G. L. C. JENKINS, VK3ZBJ,* and H. L. HEPBURN,† VK3AFQ

In the March, April and June 1971 issues of "A.R." the authors described a 146 MHz. i.m. transceiver. The June issue made mention of the use of the B3/12 and B12/12 C.T.C. power devices marketed in Australia by Varian. Further up in the power level, Varian market the C.T.C. B25/12 and the C.T.C. B40/12 which, at 146 MHz., can be expected to give 25/30 and 45/50 watts of r.f. output when powered from a 13.6v. rail.

This article is intended briefly to describe an "add on" 146 MHz. p.a. which uses the B25/12 device.

The circuit diagram is given in Fig. 1 and a close basic resemblance can be seen to the 2/3 watt driver and 10/15 watt p.a. originally described. Whilst, electrically, the resemblance is real, there is an equally real divergence when the components used are considered. In the 25 watt unit the d.c. and r.f. currents flowing are high and the components used have to handle these increased currents.

In the units so far built and tested the two input fixed capacitors (6.8 pF. and 22 pF.) are Philips ceramic beads as is the 22 pF. fixed capacitor in the collector circuit of the B25/12. The

two 33 pF. fixed capacitors between output and ground are unencapsulated silver micas. The 9 pF. trimmer in the input circuit is a Shinmei unit, while the 3/30 pF. trimmer in the collector circuit is an El-Menco type T50210 20 pF. mica compression trimmer. The performance of this trimmer in high current duty at 146 MHz. is significantly in excess of that obtained with the more usual type of ceramic compression trimmer. The El-Menco component is marketed by A.E.E. Capacitors, of Bell Street, Preston, Vic.

The base choke is a Philips 2½ turn RFC type 4312-020-36700 modified by replacing the original wire by two parallel wires through the ferrite core. The ferrite used is "lossy" at the frequencies involved and use of alternative ferrites (such as F29 coil former slugs) can lead, at the best, to low efficiency in the p.a. and, at the worst, to breakdown of the transistor. It is essential that the choke used has a low Q and a low impedance at the operating frequency. Use of high Q or high Z chokes may generate voltages at the base which could exceed the ratings of the transistors.

RF3 is used only as an h.t. line decoupling device and here an F29 slug on a single wire answers the purpose well.

RF2 is air wound to the dimensions given.

The whole unit is mounted on a piece of (suitably etched) circuit board 4" x 2½" used with the copper side uppermost. The components are soldered direct across the appropriate "lands" on the p.c.b. and no wires go through the board. This method of mounting is used so that the board can be laid direct on to a metal heat sink with the main fixing bolt of the transistor making good thermal contact to the heat sink. If one assumes an r.f. output of 25 watts and a d.c. efficiency of, say, 60%, then it can be readily appreciated that some 15 watts of the d.c. input energy must be dissipated as heat. Those attracted by the mathematics involved may care to do some sums, but in practice a piece of 1" thick aluminium, painted matt black, at least the same dimensions as the p.c.b. itself, is required.

The general method of tuning up is the same as that described in the April 1971 issue of "A.R." for the 3 and 10 watt power stages. As a guide to performance, the unit now described when running from a 12.6 volt supply draws 3.3 amps. d.c. Under these conditions the measured r.f. output is 25 watts and the d.c. to r.f. conversion 80%.

* 17 Noel Street, East Brighton, Vic. 3187.

† 4 Elizabeth Street, East Brighton, Vic. 3187.

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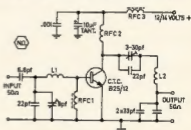
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- L2-2 turns 18 gauge tinned copper, 5/16-in. i.d., 1/2-in. long
- RF1-Philips 4312-020-36700 ferrite RFC-modified, see text
- RF2-4 turns 18 gauge tinned copper, 1/4-in. i.d., 1/2-in. long
- RF3-Neosil F29 slug on single wire.

N.S.W. DIVISION, W.I.A.

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See Programme in February "A.R." Details and inquiries to Central Coast Branch of the W.I.A., P.O. Box 238, Gosford, N.S.W., 2250

SIMPLE TRANSISTOR TESTER FOR THE BEGINNER

HARDY SCHONING,* VK2BBA

INTRODUCTION

If you use semiconductors rather than valves in constructing equipment, you are bound to collect, over a period of time, a considerable number of odd transistors and diodes. These finally end up in a box and when you want one either you cannot ascertain the number or you cannot trace it in your data book.

Most of these odd bits would be quite unsuitable for building a 2 metre rig, but would have many applications in the low frequency ranges if only you knew what they were.

A small instrument is described which will enable you to determine the polarity (NPN or PNP), d.c. gain h_{FE} and the leakage current I_{CBO} as well as the polarity of diodes.

All the values given are for silicon transistors—

$$(V_{AS} = 0.6V.)$$

However, the tester can be used for both silicon and germanium devices without change.

PRINCIPLE OF TRANSISTOR D.C. GAIN MEASUREMENT

As the beginner will already know, the current gain of a transistor in common emitter circuit is—

$$h_{FE} = I_C \div I_B$$



FIG. 1

If the base current is set at a simple value (1 mA. or 100 μ A.) and you measure the collector current I_C , the equation may be solved easily as follows—

$$I_B \text{ set to } 1 \text{ mA}$$

$$I_C \text{ reads on meter } 39 \text{ mA.}$$

$$h_{FE} = 39 \text{ mA.} \div 1 \text{ mA.}$$

$$= 39$$

In other words, you can take the reading on the collector mA. meter as d.c. gain h_{FE} —you can take the mA. meter scale as it is for a h_{FE} scale. We can introduce the further following simplification—

$$\text{We know } I_C = I_C + I_B$$

$$\text{and } h_{FE} = I_C \div I_B$$

$$\text{so } I_C = I_C + h_{FE} I_B$$

$$\text{then } I_B = I_C \div (I_C + h_{FE} I_B)$$

$$\text{or } I_C = I_C [1 + (1 \div h_{FE})]$$

The gain h_{FE} of most transistors is greater than 20, so the fraction $1 \div h_{FE}$ is 0.05, and getting smaller with increasing gain.

We, therefore, say the expression $1 \div h_{FE}$ is, for our purpose, small enough to be disregarded. We simplify our tester by saying

$$I_C = I_B$$

I_C is easier to measure.

DESIGN OF THE TRANSISTOR TESTER

If you understand the principle of the gain measurement, there should be no problem in designing a simple circuit. Here is one example which you could choose yourself—

$$V_{CC} = 3 \text{ V.}$$

$$I_B = 100 \mu\text{A.}$$

$$\text{Instrument} = 10 \text{ mA.} = h_{FE} 100 \text{ f. scale}$$

$$2 \text{ Range} = 50 \text{ mA.} = h_{FE} 500 \text{ f. scale}$$

$$\text{so } 1 \text{ mA. would be } h_{FE} \text{ of } 10$$

$$2 \text{ mA. " " " " " " } 20 \text{ etc.}$$

$$\text{Assume: Base-Emitter voltage}$$

$$V_{AS} = 0.6 \text{ V.}$$

(for silicon transistor, slightly less for germanium).

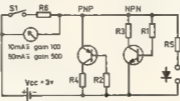
Find with simple calculation:

$$R_1 = R_2 = (V_{CC} - V_{AS}) \div I_B$$

$$= (3 \text{ V.} - 0.6 \text{ V.}) \div 100 \mu\text{A.}$$

$$R_1 = R_2 = 24 \text{ K} \Omega.$$

I used 22K Ω 2% because it is a standard value. You can make the resistor out of one 22K Ω and 2.2K Ω if you like to be more precise.



TRANSISTOR TESTER WITH TWO SOCKETS
FIG. 2

In Fig. 2, $R_3 = R_4$ are in the circuit for current limiting purposes in case of a wrong connection. I_C maximum of 60 mA. is allowed for. This current is permissible for smaller transistors for short periods, thus—

$$R_3 = R_4 = V_{CC} \div I_C \text{ max.}$$

$$= 3 \text{ V.} \div 60 \text{ mA.}$$

$$R_3 = R_4 = 50 \Omega.$$

Insert, therefore, the nearest values you have available, 56 Ω or 47 Ω $\pm 10\%$, $\frac{1}{4}$ watt or more. Be careful not to wire R_3 or R_4 as a common resistor in series with the battery, as this would influence the base current I_B .

For diodes two more connections are brought out. R_5 limits the forward current.

$$R_5 = (V_{CC} - V_F) \div I_C \text{ max.}$$

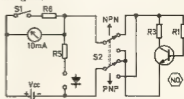
$$(3 \text{ V.} - 0.6 \text{ V.}) \div 10 \text{ mA.}$$

$$R_5 = 240 \Omega.$$

For R_5 I chose 330 Ω $\pm 10\%$ because I had one handy.

To extend the gain reading to 500 you shunt the meter with R_6 . This resistor value must depend upon the resistance of your milliammeter. Calculate it for a full scale of 50 mA. with your multimeter.

In this range R_3 and R_4 will reduce the collector-emitter voltage by high gain transistors, but the tester still will give a reasonable indication of the gain.



TRANSISTOR TESTER WITH ONE SOCKET
AND NPN-PNP SWITCH FIG. 3

A small (1 $\frac{1}{2}$ " x 1 $\frac{1}{2}$ ") miniature edge-wise panel meter was purchased cheaply with a 0-10 linear scale. This was calibrated against a multimeter for two ranges, 10 mA. full scale for a gain of 100, 50 mA. full scale for a gain of 500. You could take out two connector terminals so as to use your multimeter as a milliammeter. In any event, multiply your mA. reading by 10 to obtain the d.c. gain of the transistor.

Two TO18 sockets were handy so these were used instead of PNP-NPN switch. Terminals for the diode test were two 8BA screw heads. S_1 is a slide switch, on-off. All of this was built with two UM-3A dry batteries in a cheap little plastic box.

Care taken in assembly will ensure a good appearance and the plastic will take many hard knocks. If you have only one socket, use a switch to change the polarity as shown in Fig. 3. If you have no sockets, a 3-wire outlet with clips will be satisfactory. An on-off switch for the battery is not required, it will last many months.

USING THE TESTER WITH UNKNOWN TRANSISTORS

To determine the connections of the unknown transistor, look up the type of case in the handbook or similar publication, but, if you cannot find it, take a guess bearing in mind that the metal can may often be the collector connection.

I_{CBO} Test: Bend the base wire up; plug the collector and emitter into the NPN-PNP socket. There should be no current reading on either polarity; if there is, the transistor is leaky. If there is a full scale deflection on one polarity and not the other, you do not have the right connection on the transistor, i.e. you have either the collector-base or emitter-base junction, so keep trying to find the two poles which give no reading. These are emitter and collector. The third wire is the base.

NPN or PNP? Connect the collector lead—or the one you think it is—to the collector terminal and connect the base to the emitter terminal. If there is no current indication, you have the

(Continued on Page 15)

* 6/85 Copland Street, Liverpool, N.S.W., 2170.

THE PHASE-LOCK LOOP

PART ONE

R. F. DANNECKER,* VK4ZFD

This is the first of two articles written with a view to acquainting Amateurs with the principles of the phase-lock loop. Applications of the phase-lock loop are outlined and the use of a phase-lock loop as an optimum f.m. discriminator is discussed.

The basic phase-lock loop is shown in block diagram form in Fig. 1. It comprises three basic components —

- (1) A phase detector (Fig. 2),
- (2) A low pass filter (Fig. 3),
- (3) A voltage controlled oscillator (v.c.o.) (Fig. 4).

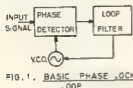


FIG. 1. BASIC PHASE LOCK LOOP

The phase of a periodic input signal and that of the v.c.o. is compared by the phase detector; output of the phase detector is a measure of the phase difference between its two inputs. This difference voltage is then filtered by the loop filter and applied to the v.c.o. Control voltage on the v.c.o. changes the frequency in a direction that reduces the phase difference between the input signal and the v.c.o.

When the loop is "locked" the control voltage is such that the frequency of the v.c.o. is exactly equal to the average frequency of the input signal.

Suppose now that the input signal carries information in its phase or frequency; this signal is inevitably corrupted by additive noise. Suppose also that the v.c.o. is the "local oscillator" in some form of receiver. The task of such a phase-lock "receiver" is to reproduce the original signal while

removing as much of the noise as possible. If the "local oscillator" could be locked to the input signal and made insensitive to the random noise on this signal, then the input signal could be reconstructed.

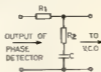


FIG. 3. TYPICAL LOW PASS FILTER

The transfer function of this filter is

$$H(S) = \frac{S C R_2 + 1}{S C (R_1 + R_2) + 1} + 1$$

where S is the complex variable.

The input to the loop is a noisy signal, whereas the output of the v.c.o. is a cleaned-up version of the input. To suppress noise, the error output signal from the phase detector is averaged over some length of time by the loop filter, and the averaged error is then used to control the frequency of the oscillator. It is reasonable, therefore, to consider the loop as a kind of filter that passes signals and rejects noise.

Two important characteristics of the filter are that the bandwidth can be very small and the filter automatically tracks the signal frequency. Narrow bandwidth is capable of rejecting large amounts of noise; it is not at all unusual for a phase-lock loop to recover a signal deeply embedded in noise.

One application of the phase-lock loop is as the local oscillator in a synchronous or homodyne receiver. In essence this receiver consists of nothing but a local oscillator, a mixer, and an audio amplifier. To operate, the oscillator has to be adjusted to exactly the same frequency as the carrier of the incoming signal which is then converted to an intermediate frequency of zero Hz. Output of the mixer contains demodulated information that is carried as sidebands by the signal. Correct tuning of the local oscillator is essential to synchronous reception; any frequency error whatsoever will hopelessly garble the information. Further-

more, phase of the local oscillator must agree, very closely, with the received carrier phase. In other words, the local oscillator must be phase-locked to the incoming signal.

Another common application arises in television receivers. The flywheel synchronisers in present-day t.v. receivers are really phase-locked loops.

Space use of phase-lock began with the first American (Russian?) artificial satellites. These carried 10 mW. c.w. transmitters; received signals were correspondingly weak. Furthermore, Doppler shift made the exact frequency uncertain. At the 108 MHz. frequency used, the Doppler shift could range over a ± 3 KHz. interval. Hence an ordinary fixed-tuned receiver would require at least a 6 KHz. bandwidth

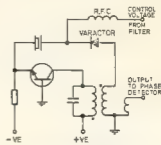


FIG. 4. TYPICAL VOLTAGE CONTROLLED OSCILLATOR

for a signal that could be contained in something like a 6 Hz. bandwidth. This entails a noise penalty (noise is directly proportional to bandwidth) of 1,080 times, i.e. 30 dB. Such penalties are intolerable and that is why narrow-band phase-locked tracking receivers are used.

Noise can be rejected by a narrow-band filter, but if the filter is fixed, the signal will almost never be within the passband. For a narrow filter to be usable it must be capable of tracking the signal. A phase-locked loop is capable of providing both the narrow bandwidth and tracking that are needed. Current applications of phase-lock include —

(Continued on Page 18)

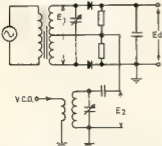


FIG. 2. TYPICAL PHASE DETECTOR

If the signal input is $E_r \sin(2\pi ft)$ and the v.c.o. is $E_2 \cos(2\pi ft + \theta)$ then the output of the detector is $E_d \sim 2E_2 \sin \theta$ or for small θ , $E_d \propto E_2 \theta$ for $E_2 > E_1$, i.e. the output voltage is proportional to the phase difference between the signal input and the v.c.o.

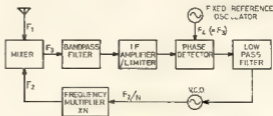


FIG. 5. BASIC PHASE LOCK RECEIVER

* 52 Pohlman Street, Southport, Qld., 4215.

AUSTRALIAN DX CENTURY CLUB AWARD

OBJECTS

1. This Award was created in order to stimulate interest in working DX in Australia and to give successful applicants some tangible recognition of their achievements.
2. This Award, to be known as the "DX Century Club" Award, will be issued to any Australian Amateur who satisfies the following conditions.
3. A certificate of the Award will be issued to applicants who show proof of having contacted one hundred countries, and will be endorsed as necessary, for contacts made using only one type of emission.

REQUIREMENTS

- 2.1 Verifications are required from one hundred different countries as shown in the Official Countries List.
- 2.2 The Official Countries List will be published annually in "Amateur Radio" and will be amended from time to time as required. Should a country be deleted from the Countries List at any time, members and intending members will be credited with such country if the date of contact was before such deletion.
- 2.3 The commencing date for the Award is 1st January, 1946. All contacts made on or after this date may be included.

OPERATION

- 3.1 Contacts must be made in the H.F. Band Band 7 which extends from 3 to 30 MHz. All such contacts must only be made in the authorised Amateur Bands in Band 7.
- 3.2 All contacts must be two-way contacts on the same band. Cross band contacts will not be allowed.
- 3.3 Contacts may be made using any authorised type of emission for the band concerned.

- 3.4 Credit may only be claimed for contacts with stations using regularly-assigned Government call signs for the country concerned.

- 3.5 Contacts made with ship or aircraft stations will not be allowed, but land mobile stations may be claimed provided their specific location at the time of contact is clearly shown on the verification.

- 3.6 All stations must be contacted from the same call area by the applicant (except as below), although if the applicant's call sign is subsequently changed, contacts will be allowed under the new call sign providing the applicant is still in the same call area.

If the applicant moves to another call area contacts must be made from within a radius of 150 miles of the previous location to qualify for award purposes. If the distance of the new location from the old exceeds a radius of 150 miles, a separate application for a new award must be made claiming only contacts made from the new location.

- 3.7 All contacts must be made when operating in accordance with the Regulations laid down in the Handbook for the Guidance of Operators of Amateur Wireless Stations or its successor.

VERIFICATIONS

- 4.1 It will be necessary for the applicant to produce verifications in the form of QSL cards or other written evidence showing that two-way contacts have taken place.

- 4.2 Each verification submitted must be exactly as received from the station contacted, and altered or forged verifications will be grounds for disqualification of the applicant.

- 4.3 Each verification submitted must show the date and time of contact, type of emission and frequency band used, the report and the location or address of the station at the time of contact.

- 4.4 A check list must accompany every application setting out the details for each claimed station in accordance with the details required in Rule 4.3.

APPLICATIONS

- 5.1 Applications for membership shall be addressed to the Federal Awards Manager, W.I.A. P.O. Box 21, East Melbourne, Vic. 3002, accompanied by the verifications and check list with sufficient postage enclosed for their return to the applicant, registration being included if desired.

- 5.2 A nominal charge of 25c, which shall also be forwarded with the application, will be made for the issue of the certificate to successful applicants who are non-members of the Wireless Institute of Australia.

- 5.3 Successful applicants will be listed periodically in "Amateur Radio". Members of the D.X.C.C. wishing to have their verified country totals, over and above the one hundred necessary for membership, listed will notify these totals to the Federal Awards Manager.

- 5.4 In all cases of dispute, the decision of the Federal Awards Manager and two officers of the Federal Executive of the W.I.A. in the interpretation and application of these Rules shall be final and binding.

- 5.5 Notwithstanding anything to the contrary in these Rules, the Federal Council of the W.I.A. reserves the right to amend them when necessary.

AUSTRALIAN V.F.F. CENTURY CLUB AWARD

OBJECTS

1. This Award has been created in order to stimulate interest in the V.F.F. bands in Australia, and to give successful applicants some tangible recognition of their achievements.
2. This Award, to be known as the "V.F.F. Century Club" Award, will be issued to any Australian Amateur who satisfies the following conditions.

3. Certificates of the Award will be issued to the applicants who show proof of having made one hundred contacts on the V.F.F. bands, and will be endorsed as necessary, for contacts made using only one type of emission.

REQUIREMENTS

- 2.1 Contacts must be made in the V.F.F. Band Band 8 which extends from 30 to 300 MHz., but such contacts must only be made in the authorised Amateur Bands in Band 8.

- 2.2 In the case of the authorised bands between 30 and 100 MHz., verifications are required from one hundred different stations, at least seven of which must be Australian. The Amateur Bands 50 to 54 MHz. and 56 to 60 MHz. will be counted as one band for the purposes of the Award.

- 2.3 In the case of the authorised Amateur Band between 100 to 300 MHz., verifications from one hundred different stations are required.

- 2.4 It is possible under these rules for one applicant to receive two certificates, one for each of the authorised Amateur Bands contained in Rules 2.2 and 2.3.

- 2.5 The commencing date for the Award is 1st June, 1948. All contacts made on or after this date may be included.

OPERATION

- 3.1 All contacts must be two-way contacts on the same band, and cross band contacts will not be allowed.
- 3.2 Contacts may be made using any authorised type of emission for the band concerned.

- 3.3 Fixed stations may contact portable/mobile stations and vice versa, but portable/mobile station applicants must make their contacts from within the same call area.

- 3.4 Applicants, when operating either portable/mobile or fixed, may contact the same station licensee, but may not include both contacts for the same type of endorsement.

- 3.5 Applicants may only count one contact for a station worked as a limited licensee with a Z or Y call sign who is subsequently contacted as a full A.C.C. Verifications will be allowed under the new call sign providing the applicant is still in the same call area.

- 3.6 All stations must be contacted from the same call area by the applicant (except as below), although if the applicant's call sign is subsequently changed, contacts will be allowed under the new call sign providing the applicant is still in the same call area.

If the applicant moves to another call area contacts must be made from within a radius of 150 miles of the previous location to qualify for award purposes. If the distance of the new location from the old exceeds a radius of 150 miles, a separate application for a new award must be made claiming only contacts made from the new location.

- 3.7 All contacts must be made when operating in accordance with the Regulations laid down in the Handbook for the Guidance of Operators of Amateur Wireless Stations or its successor.

VERIFICATIONS

- 4.1 It will be necessary for the applicant to produce verifications in the form of QSL cards or other written evidence showing that two-way contacts have taken place.

- 4.2 Each verification submitted must be exactly as received from the station contacted, and altered or forged verifications will be grounds for disqualification of the applicant.

- 4.3 Each verification submitted must show the date and time of contact, type of emission and frequency band used, the report and the location or address of the station at the time of contact.

- 4.4 A check list must accompany every application setting out the following details—

- 4.4.1 Applicant's name and call sign, and whether a member of the W.I.A. or not.

- 4.4.2 Band for which application is made, and whether special endorsement is involved.

- 4.4.3 Where applicable, the date of change of call sign and previous call sign.

- 4.4.4 Details of each contact as required by Rule 4.3.

- 4.4.5 The applicant's location at the time of each contact if portable/mobile operation is involved.

- 4.4.6 Any relevant details of any contact about which some doubt might exist.

APPLICATIONS

- 5.1 Applications for membership shall be addressed to the Federal Awards Manager, W.I.A. P.O. Box 21, East Melbourne, Vic. 3002, accompanied by the verifications and check list with sufficient postage enclosed for their return to the applicant, registration being included if desired.

- 5.2 A nominal charge of 25c, which shall also be forwarded with the application, will be made for the issue of the certificate to successful applicants who are non-members of the Wireless Institute of Australia.

- 5.3 Successful applicants will be listed periodically in "Amateur Radio". Members of the V.F.F.C.C. wishing to have their verified country totals, over and above the one hundred necessary for membership, listed will notify these totals to the Federal Awards Manager.

- 5.4 In all cases of dispute, the decision of the Federal Awards Manager and two officers of the Federal Executive of the W.I.A. in the interpretation and application of these Rules shall be final and binding.

- 5.5 Notwithstanding anything to the contrary in these Rules, the Federal Council of the W.I.A. reserves the right to amend them when necessary.

AUSTRALIAN D.X.C.C. COUNTRIES LIST

	Phone	C.W.		Phone	C.W.
A2—Botswana	21 404 0 0 0000 0100 0000 0000	00000000000000000000000000000000	FS7—Saint Martin	21 4 0000 01 00 0000 0000 00 00	
AC3—Sikkim	0 0100 0000	0000 0000 0000 0000 0000	FW8—Wallis and Futuna Is.		
AC4—Tibet	00 0000 0000 0000 0000 0000 0000	00000000000000000000000000000000	FY7—French Guiana and Inini		
AC5—Bhutan	00 00 00 0000 0000 0000 0000 0000	00000000000000000000000000000000	G—England		
AP—East Pakistan	00 0000 0000 0000 0000 0000 0000	00000000000000000000000000000000	GC—Guernsey and Dependencies		
AP—West Pakistan	00 0000 0000 0000 0000 0000 0000	00000000000000000000000000000000	GG—Jersey Is.		
BV—Taiwan	000 0000 0000 0000 0000 0000 00 00	00000000000000000000000000000000	GD—Isle of Man		
BY—China	00 0000 0000 0000 0000 0000 0000	00000000000000000000000000000000	GI—Northern Ireland		
C2—Nauru	0 00 0 0 0 0000 0 0 0000 0000 0	0 00000000000000000000000000000000	GM—Scotland		
C3—Andorra	0000 0000 0 0 0000 0000 0000 0000	00000000000000000000000000000000	GW—Wales		
CE—Chile	0 0000 0000 0000 0000 0000 0 00	00000000000000000000000000000000	HA—Hungary		
CE9AA-AM, FB8Y, KC4, LA, LU-Z,			HB3—Switzerland		
OR4, UA1, VK0, VP8, ZL5, ZS1,			HB8—Liechtenstein		
8J—Antarctica	01 0 0000 0000 0000 0000 0000	0 00000000000000000000000000000000	HC—Ecuador		
CE0A—Easter Is.	0 0 0000 0000 0 0000 0000 0000	0 00000000000000000000000000000000	HCB—Galapagos		
CE0X—San Felix	0 0000 0000 0000 0000 0000 0000	0 00000000000000000000000000000000	HH—Haiti		
CE0Z—Juan Fernandez			HI—Dominican Republic		
CM, CO—Cuba	0000 0000 0000 0000 0000 0000 0000	00000000000000000000000000000000	HK—Columbia		
CN—Morocco	00 00 0000 0000 0000 0000 0000	00 00000000000000000000000000000000	HK6—Bajo Nuevo		
CP—Bolivia	00 0000 0000 0000 0000 0000 0 0 0000	00000000000000000000000000000000	HK6—Malpelo Is.		
CR3—Portuguese Guinea	00 00 0000 0000 0000 0000 0000	00000000000000000000000000000000	HK6—San Andres and Providencia		
CR4—Cape Verde Is.	0 0000 0000 0000 0000 0000 0000	00 00000000000000000000000000000000	HL, HM—Korea		
CR5—Principe, Sao Thome	00 0000 0000 0000 0000 0000 0000	00 00000000000000000000000000000000	HP—Panama		
CR6—Angola	0 0 0000 0000 0000 0000 0000 0000	0 00000000000000000000000000000000	HR—Honduras		
CR7—Mozambique	00 0000 0000 0000 0000 0000 0000	00000000000000000000000000000000	HS—Thailand		
CR8—Portuguese Timor	00 0000 0000 0000 0000 0000 0000	00000000000000000000000000000000	HV—Vatican		
CR9—Macao	0 0000 0000 0000 0000 0000 0000 0	00000000000000000000000000000000	HZ, 7Z—Saudi Arabia		
CT1—Portugal	0000 0000 0000 0 0 0000 0000 0000	00000000000000000000000000000000	I, IT—Italy		
CT2—Azores	0000 0 00 0000 0000 0000 0000 0000	00000000000000000000000000000000	IS1—Sardinia		
CT3—Madeira	0 0 00 0000 0000 0000 0000 0000	00000000000000000000000000000000	JA, JH, JR, KA—Japan		
CX—Uruguay	0 000 0000 0 0000 0000 0000 0000	00000000000000000000000000000000	JD1—Minami Torishima		
DA, DJ, DK, DL, DM—Germany			JD1—Ogasawara and Kazan Is.		
DU—Philippine Is.	0000 0 0000 0000 0000 0000 0000	00000000000000000000000000000000	JT—Mongolia		
EA—Spain	0000 0 0 0000 0000 0000 0000 0000	00000000000000000000000000000000	JW—Svalbard		
EA6—Balearic Is.			JX—Jan Mayen		
EA8—Canary Is.	0000 0000 0000 0 0000 0000	00000000000000000000000000000000	JY—Jordan		
EA9—Rio de Oro	00 0000 0000 0000 0000 0000 0000	00000000000000000000000000000000	K, KN, W, WA, WB, WN—United States		
EA9—Ceuta and Melilla	0 0 0000 0000	00000000000000000000000000000000	of America		
EI—Ireland	0 0 0		KB5—Baker, Howland and American		
EL—Liberia	0 0000 0000 0000 0000 0000	00000000000000000000000000000000	Phoenix Is.		
EP—Iran	0000 0 0 0000 0000 0000 0000 0000	00000000000000000000000000000000	KC4—Navassa Is.		
ET—Ethiopia	00 0000 0000 0000 0000 0000 0000	00000000000000000000000000000000	KCB—Eastern Caroline Is.		
F—France	0 0 0000 0000 0000 0000 0000 0000	00000000000000000000000000000000	KCB—Western Caroline Is.		
FB8W—Crozet Is.			KG4—Guantanamo Bay		
FB8X—Kerguelen Is.	0000 0000 0000 0000 0000 0000 0000	00000000000000000000000000000000	KG6—Guam		
FB8Z—Amsterdam and St. Paul Is.	0000 0000 0000 0000 0000 0000 0000	00000000000000000000000000000000	KG6—Mariana Is.		
FC—Corsica	0000 0000 0000 0000 0000 0000 0000	00000000000000000000000000000000	KH6, WH6—Hawaiian Is.		
FG7—Guadeloupe	00 0000 0000 0000 0000 0000 0000	00000000000000000000000000000000	KH6—Kure Is.		
FH8—Comoro Is.	0000 0000 0000 0000 0000 0000 0000	00000000000000000000000000000000	KJ6—Johnston Is.		
FK3—New Caledonia	00 0000 0000 0000 0 0000	00000000000000000000000000000000	KL7, WL7—Alaska		
FL8—French Somaliland	00 0000 0 0 0000 0000	00000000000000000000000000000000	KM6—Midway Is.		
FM7—Martinique	00 0000 0000 0000 0000 0000 00 0000	0 00000000000000000000000000000000	KP4, WP4—Puerto Rico		
FO8—Clipperton Is.	0 0 0 0 0000 0000	00000000000000000000000000000000	KP6—Palmyra Group, Jarvis Is.		
FO8—French Oceania	0000 0000 0000 0000 0 0 0000	0 00000000000000000000000000000000	KR6, 8—Ryuku Is.		
FP8—St. Pierre and Miquelon	00 0000 00 0000	00000000000000000000000000000000	KS4—Swan Is.		
FR7—Glorioso Is.	0000 0000 0000 0000 0000 0000 0000	00000000000000000000000000000000	KSAB, HK0—Serrana Bank and Ron-		
FR7 Juan de Nova	0 0 0000 0 0000 0000 0000	00000000000000000000000000000000	cador Cay		
FR7 Reunion Is.			KS6—American Samoa		
FR7 Tromelin			KV4, WV4—Virgin Is.		

	Phone	C.W.		Phone	C.W.
KW6—Wake Is.			UI8, UK8A, C, D, F, G, I, L, O, T, U,		
KX8—Marshall Is.			Z—Uzbek		
KZ5—Canal Zone			UJ8, UK8J, R—Tadzhik		
LA—Norway			UL7, UK7—Kazakh		
LU—Argentina			UM8, UK8M, N—Kirghiz		
LX—Luxembourg			UO5, UK5O—Moldavia		
LZ—Bulgaria			UP2, UK2B, P—Lithuania		
MP4B—Bahrain			UQ2, UK2G, Q—Latvia		
MP4D, T—Trucial Oman			UR2, UK2R, T—Estonia		
MP4M—Sultanate of Muscat and Oman			VE, VO—Canada		
MP4Q—Qatar			VK—Australia		
OA—Peru			VK2—Lord Howe Is.		
OD—Lebanon			VK4—Willis Is.		
OE—Austria			VK9AA—MZ—New Guinea		
OH—Finland			VK9AA—MZ—Papua		
OH0—Aland Is.			VK9NA—NZ—Norfolk Is.		
OJ0—Market Reef			VK9XA—XZ—Christmas Is.		
OK—Czechoslovakia			VK9YA—YZ—Cocos Is.		
ON—Belgium			VK0—Heard Is.		
OX—Greenland			VK0—Macquarie Is.		
OY—Faroe Is.			VP1—British Honduras		
OZ—Denmark			VP2A—Antigua, Barbuda		
PA—Netherlands			VP2D—Dominica		
PJ—Netherlands Antilles			VP2E, K—Anguilla		
PJ—Sint Maarten			VP2G—Grenada and Dependencies		
PY—Brazil			VP2K—St. Kitts, Nevis		
PY0—Fernando de Noronha			VP2L—St. Lucia		
PY0—St. Peter and St. Paul's Rocks			VP2M—Montserrat		
PY0—Trinidad and Martin Vaz Is.			VP2S—St. Vincent and Dependencies		
PZ—Surinam			VP2V—British Virgin Is.		
SK, SL, SM—Sweden			VP5—Turks and Caicos Is.		
SP—Poland			VP7—Bahama Is.		
ST—Sudan			VP8—Falkland Is.		
SU—Egypt			VP8, LU-Z—South Georgia Is.		
SV—Crete			VP8, LU-Z—South Orkney Is.		
SV—Dodecanese			VP8, LU-Z—South Sandwich Is.		
SV—Greece			VP8, LU-Z, CEBAN—AZ—South Shet-		
TA—Turkey			land Is.		
TF—Iceland			VP9—Bermuda Is.		
TG—Guatemala			VQ1—Zanzibar		
TI—Costa Rica			VQ9—Aldabra Is.		
TI9—Cocos Is.			VQ9—Chagos Is.		
TJ—Cameroun			VQ9—Desroches		
TL—Central African Republic			VQ9—Farquhar		
TN—Congo Republic			VQ9—Seychelles		
TR—Gabon			VR1—British Phoenix Is.		
TT—Chad			VR1—Gilbert, Ellice and Ocean Is.		
TU—Ivory Coast			VR2—Fiji Is.		
TY—Dahomey			VR3—Fanning and Christmas Is.		
TZ—Mali			VR4—Solomon Is.		
UA1-8, UK1, 3, 4, 5, 6A, E, H, I, J, L,			VR5—Tonga		
P, U, W, X, Y, UW1-8—European			VR6—Pitcairn Is.		
Russian S.F.S.R.			VS5—Brunei		
UA9, 0, UK9, UW9, 0—Asiatic			VS6—Hong Kong		
R.S.F.S.R.			VS9K—Kumaran Is.		
UA1—Franz Josef Land			VU—Andaman and Nicobar Is.		
UA2, UK2F—Kaliningradsk			VU—India		
UB5, UK5—Ukraine			VU—Laccadive Is.		
UC2, UK2A, C, I, L, O, S, W—White			XE, XF—Mexico		
Russian S.S.R.			XF4—Revilla Gagedo		
UD6, UK6C, D, K—Azerbaijan			XT—Voltaic Republic		
UF8, UK6F, O, V—Georgia			XU—Cambodia		
UG8, UK6G—Armenia			XW—Laos		
UH8, UK8H—Turkoman			XZ—Burma		

	Phone	C.W.
YA—Afghanistan		
YB, YC, YD—Indonesia		
YI—Iraq		
YJ—New Hebrides		
YK—Syria		
YN—Nicaragua		
YO—Rumania		
YS—El Salvador		
YU—Yugoslavia		
YV—Venezuela		
YVO—Aves Is.		
ZA—Albania		
ZB2—Gibraltar		
ZD3—The Gambia		
ZD5—Swaziland		
ZD7—St. Helena		
ZD8—Ascension Is.		
ZD9—Tristan da Cunha & Gough Is.		
ZE—Rhodesia		
ZF1—Cayman Is.		
ZK1—Cook Is.		
ZK1—Manahiki Is.		
ZK2—Niue		
ZL—New Zealand		
ZL/A—Auckland and Campbell Is.		
ZL/C—Chatham Is.		
ZL/K—Kermadec Is.		
ZM7—Tokelau		
ZP—Paraguay		
ZS—South Africa		
ZS2—Prince Edward and Marion Is.		
ZS3—South-West Africa		
1M—Minerva Reefs		
1S—Spratly Is.		
3A—Monaco		
3B6, 7—Agalega and St. Brandon		
3B8—Mauritius		
3B9—Rodriguez		
3C—Equatorial Guinea		
3C0—Annobon		
3V—Tunisia		
3W, XV—Vietnam		
3X, 7G—Republic of Guinea		
3Y—Bouvet Is.		
4S7—Ceylon		
4U—I.T.U. Hq. Geneva		
4W—Yemen		
4X, 4Z—Israel		
5A—Libya		
5B4, ZC4—Cyprus		
5H—Tanzania		
5N—Nigeria		
5R—Malagasy Republic		
5T—Mauritania		
5U—Niger Republic		
5V—Togo		
5W—Samoa		
5X—Uganda		
5Z—Kenya		
6O—Somali Republic		
6W—Senegal		
6Y—Jamaica		
7O—South Yemen		

	Phone	C.W.
7P—Lesotho		
7Q—Malawi		
7X—Algeria		
8P—Barbados		
8Q6, VS9M—Maldiv Is.		
8R—Guyana		
8Z4—Saudi Arabia/Iraq Neutral Zone		
9A1, M1—San Marino		
9G—Ghana		
9H—Malta		
9J—Zambia		
9K—Kuwait		
9L—Sierra Leone		
9M2, 4—West Malaysia		
9M6, 8—East Malaysia		
9N—Nepal		
9Q—Republic of the Congo		
9U—Burundi		
9V—Singapore		
9X—Rwanda		
9Y—Trinidad		
—Abu Ai, Jabal at Tair		
—Blenheim Reef		
—Ceyser Reef		
—Maria Theresa Reef		
—Melish Reef		

DELETED COUNTRIES LIST

	Phone	C.W.
CB—Manchuria (prior 16/9/63)		
CN2—Tangier (prior 1/7/60)		
CR8—Damaso, Diu (prior 1/1/62)		
CR8—Goa (prior 1/1/62)		
EA9—Iñi (prior 13/5/69)		
ET2—Eritrea (prior 15/11/62)		
FF8—French West Africa (pr. 7/8/60)		
FI8—French Indo China (pr. 21/12/60)		
FN—French India (prior 1/11/54)		
FQ8—French Equ. Africa (pr. 17/8/60)		
II—Trieste (prior 1/4/57)		
I5—Italian Somaliland (prior 1/7/60)		
JZ0—Nether. New Guinea (pr. 1/5/63)		
PK1, 2, 3—Java (prior 1/5/63)		
PK4—Sumatra (prior 1/5/63)		
PK5—Netherlands Borneo (pr. 1/5/63)		
PK6—Celebes & Moluc Is. (pr. 1/5/63)		
UN1—Karelo-Finnish Rep. (pr. 1/7/60)		
VO—Newfoundland (prior 1/4/49)		
VQ6—Brit. Somaliland (prior 1/7/60)		
VS4—Sarawak (prior 16/9/63)		
VS9H—Kuria Muria (pr. 29/11/67)		
ZC5—Brit. North Borneo (pr. 16/9/63)		
ZC6—Palestine (prior 2/7/68)		
ZD4—Gold Coast (pr. 6/3/57)		
9K3, 8Z5—Kuwait/Saudi Arabia Neut. Zone (pr. 15/12/69)		
9M2—Malaya (prior 16/9/63)		
9S4—Sear (prior 1/4/57)		
9U5—Ruanda-Urundi (between 1/7/60 and 1/7/62 only)		

THE PHASE-LOCK LOOP

(Continued from Page 10)

- (1) Perfect a.f.c. (automatic frequency control) of receivers;
- (2) P.e.m. telemetry bit synchronisation;
- (3) Frequency multipliers and dividers;
- (4) Coherent transponders;
- (5) Noisy oscillators can be enclosed in a loop and locked to a clean signal; if the loop has wide bandwidth, the oscillator tracks out its own noise and the output is greatly cleaned up.
- (6) A phase-locked loop can be used as a frequency demodulator; in which service it gives superior performance to conventional discriminators.

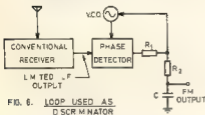


FIG. 6. LOOP USED AS DISCRIMINATOR

A simplified diagram of a super-heterodyne phase-locked receiver is shown in Fig. 5. The principal difference between this and a conventional receiver is that the local oscillator tracks the input signal, allowing a much narrower i.f. bandwidth. The smallness of the bandwidth is limited only by error and stability considerations.

Consider now the output of the phase detector; this is proportional to the phase difference between the i.f. signal and that of the local reference oscillator. As the input signal varies in frequency when modulated, so the output of the phase detector will vary in sympathy with the modulation in order that the v.c.o. track with the incoming signal to keep the frequency and phase of the i.f. signal correct. Thus this voltage from the phase detector is a demodulated version of the f.m. signal. Direct use of the phase-detector output is unsatisfactory since it would be very noisy and unfilttered. Normally the demodulated signal is taken from the loop low-pass filter.

A simpler method for using a phase-locked loop as an f.m. demodulator is shown in Fig. 6; performance is of

course not as good as a fully fledged phase-lock receiver, but practical advantages are obvious.

The threshold of a conventional discriminator is considered to be +10 dB SNR (signal-to-noise ratio) at the input to the limiter, whereas the threshold SNR for the phase-lock loop demodulator is indicated in Fig. 7.

CONCLUSIONS

The following conclusions may be drawn regarding discriminators:—

- (1) At high input SNR's there is no appreciable difference between phase-locked and conventional types.
- (2) A phase-locked loop will have a lower threshold than the +10 dB. of a conventional discriminator.
- (3) The improvement that can be gained depends on the modulation of the input signal.
- (4) For best results, the loop should be specifically designed for the modulation actually present.
- (5) Premodulating filtering can provide better performance.

In the second article on this subject, a practical f.m. demodulator using an IC will be discussed. This is of the "add on" variety as in Fig. 6.

REFERENCES

1. Gardner, F. M. "Phase-Lock Techniques," Wiley, 1966.
2. Lindsey, W. C. "Optimum Frequency Demodulation," J.P.L. Space Programmes Summary No. 37-26, vol. IV, pp. 227-237, April 1964.
3. Lathi, B. P. "Communication Systems," Wiley, N.Y. 1968.
4. McMillan, C. W. "Communication Theory Principles," Macmillan, N.Y., 1963.
5. Herman, W. W. "Principles of the Statistical Theory of Communication," McGraw Hill, N.Y., 1963.

SLOW-SCAN T.V.

(Continued from Page 7)

- "S.S.T.V.—A Taped Lecture in France, 1969," 5308VO, "73 Mag.", Dec. 1969.
 "The Videon Minicamera," WETV, "73 Mag.", Apr. 1969.
 "Slow-Scan Colour Transmission," W4UMF, "73 Mag.", Jan. 1970.
 "A Procedure for Reception of Slow-Scan Colour Pictures using Additive Synthesis," "73 Mag.", Nov. 1969.

LIST OF ABBREVIATIONS USED

- S.S.T.V.—Slow-Scan Television.
 Disc—Discriminator
 Det.—Detector
 Amp.—Amplifier.
 Integ.—Integrator
 Sync Synchronising
 Vert.—Vertical
 Horiz.—Horizontal
 Disch.—Discharge (saw tooth)
 Scan Scanning
 L.T. Low tension
 H.T. High tension
 E.H.T.—Extra high tension,
 m.s.—Milli second.
 Osc. Oscillator
 Photo.—Photograph or picture.
 Photo-multiplier Photo-sensitive tube (light sensitive)
 Lens—Optical system.
 C.r.t.—Cathode ray tube.
 P.T.—Speed of phosphor coating on c.r.t.

ACKNOWLEDGMENTS

- Ian ZLAOVY Transmissions of picture information via 14230 MHz.
 Jack Smith, of Ringwood—Photography of S.S.T.V. pictures.
 Mike Tallant, W6MKV IC circuit of a.s.t.v. monitor and board photograph.
 Articles from "QST," "73 Magazine" and "Ham Radio".

TRANSISTOR TESTER

(Continued from Page 9)

right socket or polarity. If there is any current reading, change to the other polarity. If there is no current reading in either polarity, the transistor is a reject. Base open!

D.C. Gain Measurement: Now attach all three connections of your transistor and read the gain on the meter—up to 100 on the 10 mA. scale up to 500 on the 50 mA. scale. If a very small gain is shown, you have probably erroneously transposed the collector and emitter leads, so merely interchange the two staying in the same polarity as determined previously.

Testing Known Transistor: As what you have done may appear confusing, make some tests with a known transistor to give you a better understanding, but there is really no need to do this if you know the connections of your transistor. In this case, you plug the transistor into each socket and get a gain reading in the right polarity, but nothing in the other. By disconnecting the base there should be no current. If there is a current reading, the device is a reject—leaking!

Testing a Diode: To test a diode, connect it to the diode terminals; in the forward direction it will conduct but by changing the diode connections there should be no reading.

If the device conducts in both directions, even a very small current, or there is no current at all, it is a diode.

CONCLUSION

Naturally, there are many more parameters to be measured on a semiconductor, particularly for the more serious designer. However, for most of the simple circuits and for the beginner who wants to test his test in solid state, this tester is not only very helpful as a start but it takes very little effort and time to build.

With a higher voltage ($V_{cc} = 9V$), you will improve the I_{cbo} test, but not all points under the previous heading apply, due to the early breakdown of the base emitter junction. Additional switches could, of course, extend the ranges, etc.

This simple addition of the tester has been found very handy and satisfactory and a good return for the small effort and investment.

ACKNOWLEDGMENT

Sincere thanks to Peter Dodd, VK3CIP, for editing this article

SUBSCRIPTIONS DUE

All members of the W.J.A. are reminded that annual subscriptions are now due and should be paid promptly to their Divisional Secretary. Non financial members will not receive a copy of "A.R." and back copies may not be available upon request. To preserve continuity of your files of "A.R.", please pay your annual subscription now

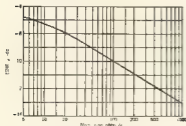


Fig. 7—Threshold for Random Modulation (Ref. 1).

Hy-Q Electronics

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for the Amateur and Professional



OSCILLATOR KITS

QO-1: 3 MHz. to 20 MHz.

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Input: 4V. to 9V. DC, 20 mA.

Output: 200 mV. on 50 ohms.

KIT LESS CRYSTAL: \$6.60

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Output: 1 MHz. }
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100 kHz. }
25 kHz. }

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Stability: Typically within 3 ppm.

Accuracy: Adjustable against WWV to within 1 ppm.

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FEATURES!**



2 SPECIAL REASONS

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Communications Receiver

- 1 "S" METER—
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W.I.A. Novice Licensing Investigation Committee

Supplementary Report, Oct. '71

COMMITTEE MEMBERS

R. C. Black, VK3YA, Chairman; P. J. Healy, VK2AFG, K. Howard, VK1AKK, D. Jones, VK2JSS, K. Walton, VK2BLW

INTRODUCTION

Since the original Novice Licensing Report was submitted to the Federal Convention last Easter a considerable amount of further material has been received from groups and individuals interested in the proposals. "Amateur Radio" has published points of view relative to (i) the desirability and otherwise of introducing a lower-level form of Amateur transmitting licence, and (ii) criticism of matters included in the original Report. In addition, letters, petitions and verbal opinions have been received in considerably greater quantity than those available prior to the completion of the original Report. It is agreed that this submission, involving a lower-level form of licence again greatly exceeded those opposing such a move. Furthermore, it is noted that the strongest support comes from (a) radio clubs which are conducting training courses for the A.O.C.P., and (b) persons situated in remote country areas away from clubs and other licencees. Amateurs.

COMMITTEE RECOMMENDATIONS REGARDING MATTERS FOR NEGOTIATION WITH THE P.M.G. DEPT

a) That the P.M.G. authorities should be asked to approve a trial period of FIVE years during which the lower-level licensing scheme should be operated and at the expiration of that period, an assessment should be made of its effect on the Amateur Service and the public interest.

Comment: This suggestion was offered by Mr. O'Burill, VK3WV, and Mr. Shawsmith VK4SS, in their letters to the P.M.G. Dept. The Novice section of the Amateur movement and other interested persons should be pleased to have the opportunity of proving their point: the lower-level licencees should be keen to demonstrate that such a scheme will function effectively. The P.M.G. Dept. should be able to assess the value of this grade of licence as a supplement to the theoretical and practical training provided by their clubs. It is noted that the majority of persons disposed towards Novice licensing will have to look forward to only a limited period of lower-level licensing if the project proves to be unsuccessful.

At present the protagonists and opponents of the Novice concept have only overseas experience and unproven opinions on which to base their ideas. A trial period will provide a firm basis for the Amateur Service and the Licensing Authority to see at first hand the value of the scheme. At the end of the trial period a conference of representatives of the P.M.G. Dept. and the Amateur community could consider (i) continuing the lower-level licensing under existing conditions, (ii) introducing modifications, and (iii) discontinuing the lower-level grade of licence.

(b) That of the various suggested schemes for an amended licensing structure, preference should be given to that which involves THREE grades of Amateur transmitting licences.

Comments: Suggestions involving four and five grades have been received by the committee. Each contains special features of merit to the Amateur Service. However, this committee feels that simplicity of administration, organization and examination procedures are important and that an additional licence should be recommended in terms of conditions specified in Appendices A, B and C to this Supplementary Report.

(c) That the suggested name of the proposed lower-level certificate should be "The Amateur Operator's Restricted Certificate of Proficiency" and that the letters "R.C.P." be indicated by the abbreviation "A.R.C.P."

Comment: There has been considerable opposition to the use of the term "Novice". Some regard it as an undesirable Americanism, that we should not Australianize it to be able to contrive our own designation; others regard the word "Novice" as connoting a lack of knowledge which is too low to maintain the prestige of the Amateur Service. The Eastern Zone of Victoria has recommended

the "Restricted" designation and this committee strongly supports this usage.

(d) That suggestions involving the new radio of "elephant" size and power should be discarded and that the original proposals of "CW ONLY" should be maintained.

Comment: In most overseas countries where lower-level operation is "CW ONLY" has been the accepted situation. In U.S.A. the original voice facility for Novice operators on one band was withdrawn and "CW ONLY" is the current situation.

(e) That there should be NO LIMITATION on licence for "Restricted" licencees.

Comment: This will be subject to review at the end of the trial period and perhaps it may be felt at that stage that a limited licence might be preferable. It is considered that the restrictions imposed on transmitting privileges will in themselves provide an incentive for holders of such licences to study further and to gain operating and practical experience leading ultimately to higher Amateur qualifications. Some correspondents to "Amateur Radio" have expressed the fear that in a "limited licence" scheme there MAY be a tendency for "time-expired" licencees to replace their equipment and engage in unlicensed transmitting. While this committee does not admit to this possibility, it is noted that it is considered that there are other valid reasons for NOT imposing a time limit.

There may be some "Restricted" operators whose equipment and experience may make them incapable of progression to A.O.C.P. level, but who could make a useful contribution to the Amateur Service nevertheless. Others may have other factors, such as financial, which prevent them from completing A.O.C.P. requirements in a limited period; others may find complete satisfaction in hobby in C.W. operating and by improving their operating speeds well beyond the examination specifications; others might be able to offer advice and instruction to newcomers to the bands. However, this committee is of the opinion that the majority of "Restricted" operators will eventually move to A.O.C.P. and/or A.O.C.P. status.

(f) That a distinctive range of call signs be suggested for operators of "Restricted" Amateur stations, such as "VK1RAA to VK1RZZ".

Comment: It is evident that such special identification and call signs for the "Restricted" operators would be a valuable contribution to the Eastern Zone in Victoria regarding the call sign proposal.

(g) That "Restricted" licencees should be permitted to operate as Fixed, Portable and Mobile station operators.

Comment: Some correspondents queried the safety aspect of Mobile operation. However, we note that the majority of "Restricted" operators would be driven at the same time as the driver operated a Morse key. It is suggested that the "Restricted" operator would operate the Mobile station as PASSENGER. This phase of Amateur Radio offers valuable technical problems and situations within the scope of the proposed "restricted" licence.

(h) That the original suggestion regarding the submission of character references by applicants for lower-level licencees should be deleted.

(i) That proposals for the use of v.h.f. bands by "Restricted" licencees should not be accepted.

Comment: The committee feels that v.h.f. technicalities and the greater technical problems than those associated with h.f. operation. It is considered that the use of v.h.f. channels could produce technical problems to a greater extent than would be likely with h.f. allocations.

(j) That the listing of suggested frequencies for operators of "Restricted" stations in Appendix C of this Supplementary Report should be used as a basis for negotiation with the P.M.G. Dept.

Comment: There have been criticisms of the original frequency proposals in the Report submitted to Easter Convention. Such criticism was anticipated and welcomed.

First, there was opposition to the use of the 1600 kHz. band. This was considered at length by the committee which includes operators experienced in this area. Local nets with low powered transmitters appear to be quite practicable "Restricted" licencees would find it easy to adapt broadcast receivers for this band.

Second, the committee admits that the DX operators have a good case for wishing to retain the use near the band edge for their specific activity. Accordingly, the committee offers revised suggestions in Appendix C.

Third, the principle of keeping "Restricted" operators off the 14 MHz. band has been well supported and no variation is suggested.

Fourth, no objection has been received to the original proposals for the 21 MHz. band and operators have been advised to apply the principle of overlapping with American Novice and Japanese Telegraphy allocations.

Fifth, the Report included a listing of the 11 metre band for lower-level operation was made. It has been suggested that the area might be made available for "Restricted" operators on "guard bands" at both ends of the existing allocation.

Sixth, it has been suggested by Mr. M. Bailey, VK6SD, that there is no activity between 28.100 and 28.500 and active groups in this section would help us keep this free allocation. Also, the Japanese Telegraphy licencees use the segment from 28.000 to 29.700 kHz. and this would offer Australian operators an opportunity to contact their counterparts.

RECOMMENDATIONS FOR ACTION BY THE WIRELESS INSTITUTE OF AUSTRALIA

(a) That in the event of a "Restricted" licensing scheme being introduced, such Division should advise members whereby such licencees would be encouraged and further instructed to higher Amateur status.

(b) That "Restricted" licencees should be permitted to hold FULL membership in the Institute.

Comment: In the original Novice Report this committee recommended that lower-level licencees should be asked to ASSOCIATE membership. This suggestion was in deference to the anticipated reluctance of established operators, the willingness of existing Amateurs to share FULL membership with "apprentice operators". However, this committee has been quite surprised at the willingness of existing Amateurs to support the concept of "Full membership for Restricted operators" that we must, therefore, recommend this variation from the original suggestion.

(c) That "Restricted" operators should be encouraged to participate in the activities of the Key Section.

Comment: As "Restricted" operators will use the c.w. mode exclusively, it is considered by the committee that they would make a major contribution to building the Key Section into a very strong W.I.A. activity. However, it is suggested that the Key Section administration should make it clear to "Restricted" operators that the Section has their welfare in mind, is interested in their problems, and will make some constructive efforts to encourage the art of Morse operating among the newcomers.

APPENDIX A

Proposed amended conditions for the award of Amateur Operators' Restricted Certificate of Proficiency

1. That candidates must pass Morse Code receiving and sending tests at an equivalent speed of FIVE words per minute.
2. That candidates must pass a written examination in the theory of electronics to the standard as for A.O.C.P. and A.O.C.P. candidates.
3. That candidates may gain "conceded" passes for "Restricted" Certificate by gaining between 50 and 60 per cent. of the possible marks in the A.O.C.P. theory examination.
4. That candidates of the "Restricted" Certificate must conform to the same age requirements as for A.O.C.P. and A.O.C.P. candidates.

APPENDIX B

Proposed Transmitting Privileges for Holders of "Restricted" Certificate ONLY

1. 10 watts input to final stage of transmitter(s).
2. Crystal control.
3. Operation permitted ONLY.
4. No time limit on holding "Restricted" licencees.
5. Operation permitted under fixed, portable and mobile (passenger operator) conditions.
6. Frequency allocations approved by the P.M.G. Department from the listing in Appendix C herewith.

APPENDIX C

Proposed Amended Frequency Allocations for Holders of "Restricted" Certificate

1. 1805 to 1855 kHz.
2. 3235 to 3575 kHz.
3. 7025 to 7065 kHz.
4. 14 MHz. band.
5. 21 030 to 21 150 kHz.
6. 27 00 to 27 50 kHz. (observing guard band)
7. 28 100 to 28 500 kHz.
8. No operation above 29 500 kHz.

Correspondence

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the publishers.

TO ALL CW OPERATORS

Editor "A.R." Dear Sir,

In this issue you will find a report by me reference a Commercial C.W. Intruder station ordering a VK Amateur off the 14 MHz. band. The fundamental of that report is that report increase you as much as it does?

With the above in mind, I have considered forming a band of operators into what, for a better name, I intend calling "The QRM Brigade".

The object of this brigade would be to cause as much QRM as possible in a legitimate manner to these c.w. intruders. The intruders under ITU regulations should not be operating in the sections of the bands under question, and therefore the Amateur operators would be quite within their rights to cause this QRM.

The exclusive Amateur bands are as follows: 2500 to 2700 3100 to 3145, 3600 to 4250 and 7000 to 7100 KHz., and it would be deemed that the Commercial are causing QRM and not vice versa.

The idea is as follows: Competent c.w. operators to scan the bands, and when an intruder or pair of intruders are heard passing traffic, to zero beat that station and call "CQ" if another Amateur comes near to the CQ to conduct a QSO zero beat with the intruder until he moves, and then follow him until he moves out of the band, or QRT. If nobody comes back to the CQ, to keep calling "CQ" until either of the above occurs.

This has been discussed with our Authorities, and the unofficial green light given so long as it is carried out on an exclusive Amateur segment of the band, and the Amateur operators within their license requirements.

Are you interested in trying to rid our bands of this "naïve Commercial interference"? Will you be sending me the "QRM Brigade" card?

A letter, or call on the air letting me know your feelings in the above would be appreciated.

—Alf Chandler, VK3LC.

MORSE TEST—AND AMATEUR LICENCE

Editor "A.R." Dear Sir,

Would those amongst us in VK land who moon and groan about having to pass a Morse test in order to obtain a full A.O.C.P. please note that by majority in the A.R.R.L. Handbook on page 704 of the R.S.G.B. magazine, "Radio Communications", Oct 1971 issue

"Philip West, Jr., son of G3PNN having learned Morse and having been in three days, attended classes with his father and passed his code test at Portsmouth on 12th June, and nine days before his graduation as an applicant ever in Britain. Philip's younger sister, Pauline, can also copy c.w.—she is eight."

Gern, it's easy—when you try!

—Eric Trebbleck, L304R.

R.D. CONTEST

Editor "A.R." Dear Sir,

I have enjoyed the R.D. Contest for many years and feel some new thoughts are in order.

In Nov. "A.R." comment is made on percentage participation. The low percentage in VK3 and VK3 is due to three factors (1) Phantom calls, (2) Limited calls, (3) Scoring.

(1) The number of persons holding a licence but not operating. I personally know four of these who have not and never will get on the air, let alone work in a contest. This is due to the fact that the States VK3 and VK3 is due to three factors (1) Phantom calls, (2) Limited calls, (3) Scoring.

(2) Limited calls. VK2 and VK3 have many of these and the results show poor participation. VK2 and VK3 have many of these and the results show poor participation. VK2 and VK3 have many of these and the results show poor participation.

(3) The points scoring system discriminates against VK2 and VK3 in that we are worth only 1 or 2 points in the contest whereas other stations are worth 3 or 4 points. This makes it very hard for contacts. If the points given/received were more equitable perhaps more would enter.

Finally, any contest in which non participants control, the scoring no State had over 90% participation) is a farce, no matter how enjoyable taking part in it.

It would be some of our brighter members get together and devise a system which would

(a) Encourage v.h.f. participation

(b) Base scores on these taking part only.

(c) Equalize points to reduce handicapping of any particular State.

—Mike O'Durtill, VK3JW

"A PRECISION INSTRUMENT"

Editor "A.R." Dear Sir,

I have seen the No. 10 Crystal Calibrator advertised in "Amateur Radio" as "a precision instrument" I differ with this statement. I recently converted one as per July 1967 "A.R." I found the dial to have a marked amount of backlash and on investigation found the springs, separating the two gear wheels driving the tuning condenser, to be slack. I considered the springs under the gears, but rotation of the dial caused one wheel to slip and the springs were again slack. So I finally what I did, this way.

I converted my set to a.c. operation, using two 6AM6s and a 5882. The 500 KHz. crystal oscillator was squeaking until I put a 1.5 meg resistor across the crystal. It finally operated rather well after adjusting the calibration to be correct.

—J. Kitchen, VK4TU.

"NIMBLE FINGERED DIAL TWISTERS"

Editor "A.R." Dear Sir,

I feel I must write in defence of the "nimble fingered dial twistlers" referred to by Mr. A. J. C. Thompson, VK4AT, in his letter on Nov. 1971 issue.

Having been licensed only three years, I am now in the above category (though not very nimble fingered, with a third-hand a.s.b. rig which backs and forth the gears, during these three years I spent several months on Sw. dial-torque, and over 13 months with 40w. c.w. rig which I built and used. I am now, with eight antennae and have plans for a ninth; helped one Amateur gain his license, and another gain his. I am now an active youth club; am now actively connected with a youth club; worked 116 countries and continued at times to DX notes in "A.R."

This is not scholasticism, I admit, but I submit that it is fairly typical of many now in the dial twisting category. There are many twisters in Amateur Radio, and even dial twisters learn something from the conditions, if nothing else. From what I have listened to on air, NO Amateur is ever satisfied with the set-up of his rig, and he is ever ready to assist others. If we gain a little entertainment and pleasure in the process, and the time and effort involved, so do not knock the dial twistlers too hard, OM. Finally, I am looking forward with pleasure to the set-up of my rig, and to the DX in the infra red and ultra violet experiments in my near future.

—Jack R. Dunne, VK3AXN

NOVICE LICENSING

Editor "A.R." Dear Sir,

In injecting a slightly different point of view into the recent licensing discussion, I make some observations not so much on the detail expressed in the report by Mr. Black as on the attitude of the A.R.R.L. towards it, but on the philosophy, or perhaps lack of it, associated with this investigation.

Probably the most significant and important sentence in the report reads as follows: "The introduction of a Novice licensing system could be a means of relieving the pressure on the existing pressure from outside interests, and justifying the continued existence of the Amateur Service." The type is mine, but the latter phrase is, I believe, the one by which the whole argument for the justification of any new form of licensing or regulatory amendment is based.

It is a pity the committee did not follow through and develop that theme. Instead, much has been made of the fact that to the W.L.A. and the Amateur Service generally by the introduction of another form of licensing, but they are low priority, and the committee themselves serve as argument for making out a case for another licensing scheme.

In the report the case for justifying the continued existence of the Amateur Service has yet to be made and does not depend on the introduction of yet another licensing grade, and even much more so because of the fact that other societies, a reform of leisure time activities, or the production of operators. In themselves, these do not constitute a by-product of Amateur activity—but not a reason of ease.

On the other hand, in the quote, that the authorship of the report believes that Amateur Radio faces a challenge. World wide majority feel

ling has been simply demonstrated at the recent I.T.U. Spars Services Conference—a feeling that Amateur Radio is a necessary and valuable to the development of more important services and we have all read of the conclusion, graciously made for the Amateur Satellite Service.

Let me give an example of the type of thinking that results in these attitudes. The following quote was relayed to me by Tom Clarkson, ZL2AZ, who attended the Conference as a member of the A.R.R.L. observer delegation. It was relayed to him by the conference, the following comment was made by a delegate from a more enlightened administration in the U.S.A. "We are going to buy a Japanese transmitter and talk to people all over the place—what you say about that?" "In the U.S.A. they have a licence, but not now, there's nothing in it. And if facilities are given for Amateur satellites, the same thing will happen—somebody will buy a space relay and talk by space relay and the same thing will happen again—we oppose these things. Even in highly developed countries the Amateurs have given up home construction."

I offer this quote to illustrate why Amateur Radio is in arguments accepted with so much reluctance. It is a pity that this delegate said is not so important—it is the implied condemnation of the Amateur Service, and the implication that the U.S.A. would multiplied around the world that has, somehow, to be changed.

What do we do? At the beginning I mentioned philosophy—a philosophy of a practical kind.

To me it seems that we have to look stock of our complete operation, we need a review of the Amateur Service, and we need to look internationally with the terms of reference so wide as to cover everything known and unknown. However, while there is no guarantee that an answer can be found, the command "Justify or perish", the conclusions reached must have some bearing on our attitude. The question is, what is the answer? Then would it be appropriate to consider the propriety of additional licensing in our structure.

—Peter Williams, VK3JZ.

Editor "A.R." Dear Sir,

Since my name appears in most of the letters this month (Nov 1) I obviously owe you a reply.

E. C. Brockbank: I could write a long comment on why I have no faith in a "low grade licence" as a means of saving the radio, but I have better talk to you on the radio about this.

The technical standard of the A.O.C.P. in 1935 was the same as it is today, in proportion to the advances in science. Why should the P.M.G. change it?

A number of writers repeat "A.O.C.P. without any preparation whatsoever". This is a quotation out of context. If you are a matriculation student AND you are interested in gaining an A.O.C.P. you will have read lots of technical magazines and the A.R.R.L. Handbook. Please read page 17 of "A.R.R.L." for Oct. 2nd last para, left hand column.

I have made constructive suggestions as to how the recommendations in the N.L. report may be amended.

Mick Rodden With reference to the regulations A.O.C.P. they are agreed on of conditions—if you are keen, you will have the handbook from cover to cover and on the night before the examination, you will read the regulations, and the minimum requirements.

R. C. Black, VK3YA My letter to Mr. Black in Oct. "A.R." is not unfriendly, it contains carefully researched facts and an offer to have a QSO.

I am sure he will be happy with the way we anticipated his request by publishing his letter, and the invitation to reply. I believe Mr. A. J. C. Thompson, VK4AT I believe Mr. Thompson is anti-Novice and he definitely regards the experiment as a failure. He does not have multi-groups in the W.L.A.—experimenters, key section, phone section, i.e. v.h.f., a.s.b., a.s.b., slow, and scan i.v. DX, and finally "award secretaries".

J. Wright Parts of the Amateur bands were not lost due to limited use, this is a myth. It was the result of the invasion of the bands by which uses its powers to acquire parts of the spectrum for commercial use.

If the members of the W.L.A. would have a "bigger voice" in the overall world market for frequencies. Mr. Wright must try to get a reply to his letter.

Jan Loughnan I hope he progresses well at school and as he sounds very keen, he should gain the A.O.C.P.

—Ivor Morgan, VK3DH, Licensed 1950.

(Continued on Page 21)

Sub-Editor DON GRANTLEY
P.O. Box 222, Parrish, N.S.W., 2750
(All times in GMT)

With good conditions looming to the fore during the month of November, we can look forward to some very pleasant hours over the holiday period. Despite the GRM, QRN and anything else you care to name, there is still a lot of good DX to be had in the 40 metre band, and not for the sake of education of the c.w. expert either. The higher bands are good, with some excellent openings on odd occasions on 20 MHz. George VK3ASV/T, for example, reports a good opening on this band at 1530 to 1540 on 16th Nov, with a MUF of 30 MHz to JA.

I was more than interested in VK3ASV's comments on the activity on 11 metres where the 21.125 net is occupied by many of our Amateurs including VK3 SAJV, SAJL, 30BS, 3ASV, 3AVI, 3IO, 3AMA, 3SS, 3DV, 3WR, 3AWW, 3TO, 3ABC, 3IF, 3CX, 1JV and some ZLs. Mac Hilliard, one of our experienced B.W.'s and long time W.A. member operating from a Sydney suburb, using one of the better class of American receivers, reports heavy activity on this band, much of it coming from legal VK sources, but a load of purely unadulterated garbage coming from American amateur band operation on 27 MHz, really gives us an idea how this monster has got out of hand.

Two points of interest arise here. Firstly, there is a lot of illegal activity by Australian pirates adopting American tactics on this band, and it would be in the interests of the VK Amateur community for these things to be put out of action. I am in the process of compiling a report for the appropriate department on this current Novice discussion. I feel that it would not hurt some of the parties concerned to have a good listen to the station on the west coast of the U.S. in the citizen band (U.S. segment of 27 MHz), then go up and have a look at the senate and correct operation by the licensed Novices in their own bands. It may correct a few mistaken ideas.

But on to DX. Firstly a few contest results of interest to the VK gang. In the 34th I.R.C. held earlier this year the winner was VK9HD with 5,963 points, with VK3MR 2,865, VK2BPN 2,586, VK2NS 850 and VK3BJL 811. The 33rd, held on 28th Nov, was won by Novice holder VK3AJHQ with 308 points in 3rd position in the c.w. section, whilst he is in 4th place in the WPK Novice roll with 808. To make a clean sweep, the same op. has now earned his WAZ on a.s.b.

Ernie Luff, our senior S.W. from VK3, has been on the sick list for the past few months, but still manages to keep the gear working, and has sent in a welcome list of QTTs which will be at the end of this column. I would like the opportunity of wishing Ernie a speedy return to health, he has been a faithful ally to me over the years in which I have been doing reports.

Activity from the Pacific area is quite plentiful, and well spread over all bands. WB6TKI/KXB has been on from that location, but is now active as W7IAC where he is to stay for a year. QSL for his operations go to Box 1249, A.P.O. San Francisco, Calif. 96401. The 32nd I.R.C. held in France, where the winners usually around 14253 and has W3PFD for her manager. His QTH is W Sedore Box 850, Thornton, Texas. TUEI, I understand, Helen is OK. H.I. KCWS will return to the States shortly in fact they probably have already. Bill is W3PFD, Helen is W4T8PA.

W9JGZ and KCGR returned to the States recently due to the death of his father, but should be back again by now under the calls of K8RDR and W7IAC. Manager is K3RLY KC6EV and K3LW are active from Marietta La., the latter's manager is W7YBX.

Advance publicity was given re a proposed joint to Kure Is. by KH6GMP and group, however, the two walkie-talkers crashed into the Kure isogon and all gifts to Kure from Midway have been cancelled, as has the operation.

XU1AA club station now has 13 Cambodian operators, including XU1V3 who is fairly active. 40 metres is the main band for XU1AA, however they plan a tri-band beam in the near future. F.C.C. now permits W stations to work XU, and JA1RSK had planned to operate all during the DX contest. H5SDR also anticipated a visit over

the first week in November. A late item says that the JA boys arrived there on Oct. 27 and stayed for a week, then flew back to Box 484, Phonm Penh, Khmer Republic.

Prefaces of Interest. XXXIX and XXXIV were specials on the "CQ" Contest, QSL to L.R.E.M., Box 1254, Bairo, Neamabou, 11440. We were again in the last week of Nov by CR1K and CR1FR. Several 913 stations used the prefix 917 during the contest. The 1974 independence celebrations. FY0CWF and FY0KPF were used recently, no reason given, but QSLs to DJ5SM and DJ5AY resp. KY6PMR was used in connection with the Space Fair from Ft. Mugu California, QSLs to W4BWWC X06FLP active in early Oct. were from the Islands International Fair, QSLs go to CH6A, 114PGM QRV from Marconi Commemorative Foundation, QSLs to Box 2128, Holmgren, 1612, and finally from the 1974 CQ Contest, QSLs from Mexico, manager W5QRM; 4801A from Venezuela, manager W1GHT, 4N0UD from Yugoslavia, via YU15J, and 343CC from Colombia, to IK3CC.

In the zone 20, ZT1AG is on 14 a.s.b. usually around 1430 to 1220 at times ranging between 1800 and 1800. He QSL address is Danbi Hou, Box 636, Ulan Bator, Mongolia. Anybody who has mailed a UA3VH/171 card to W1HNF and has not yet had a reply, please send Joe another card with QSL info, as a batch may have gone astray.

Andy MPMBL has been in the British Commonwealth Net on 11354 at 1800, and asked for QSLs to his home address, A. Matheson, Paradise Wood Cottage, Hatfield, Sussex. Steve Q3FVC operates the station while awaiting his MP4 call.

Y4KXK is Eric ZL1AJI and puts a fantastic signal in down here. His cards go to ZL400. Other party there is Y4RZ, and his manager is W6NU Y80UA Casey is QRV from Waigao Island, West Irian, OC34 for IOTA hunters, and QSL to Box 171, Djakarta, Indonesia.

To cater for the DX hunters of 40 and 80, UPRF operates on 80 metres first Monday in each month at 1430 to 1440. He has been on 7040 or 7070. D16GT had planned to do some operating on 40 and 80 during his TZ1AB trip which was completed on Nov. 10. QSLs to home address plus two TRCs.

Whilly LX1BW is QRV week-end on 3790 and 7085 a.s.b. Friday and Saturday. 19000 using TXN LAB RAA. Maybe a little use to us here, however he states that LX1BW who is using c.w. is a phoney.

If you were lucky enough to work or in the case of the S.W.I. hear EP1NY/AM, this was King Hussein of Jordan flying home from the Iran 3500th anniversary celebrations.

AWARDS

Paris Award—For contacts with stations in Paris, France. There are sweep mobile stations in contact with 20 districts, class two with fifteen, and class three with ten. QSL and 13 IRCs to F6AZM, Andre Noel, 31 rue Depueux 75-Paris 14, France. A silk scarf for VL is given with class one.

Capital Cities Award—There are five of these awards to go for, and winners take a full page in itself but to summarise, All Capitals Award is simple. Work any 20 world capital cities for the month of the award. In Jan. 1967, send GCR list and 7 IRCs to DL2HQ or DL5OT. The other four are issued from Sweden and claims should go to SM8BIX, Hufvudgatan 6, S-724-41 Vasteras. W10P 10 IRCs for each award. They are Worked European Capital Cities, Worked African Capital Cities, Worked American Capital Cities, and Worked Asia Capital Cities. For each award you need to work 15 capitals in that particular zone, and if you work a full list of 20 capitals in each zone, drop me a stamped envelope. All five awards are available on heard basis to S.W.I.

TRANS PACIFIC 160 MX TESTS

Briefly, the ones which will concern the VKs are: Jan. 1, Jan. 15, Feb. 5, Feb. 19, and Feb. 26. Each test is one for 15 minutes from 1330 to 1335, and the DX calls during the even 5 minutes. Tests last until 1600. 157V will be on 1600.15. JA are on 1607.5 to 1612.5, VK mainly 1602 to 1605 with ZL on 1678. Special notice to sunset tests between VE/W/A on same dates at 0700 to 1600 on the same dates.

SOME QUTS

HCIARE—James Club Station, Box 389, Quito Ecuador.
HC6BZ—Joe, QSL to DJ2BE.
HC8EA—Box 96, Okinawa.
VT1VC—Box 72, Port-au-Prince, Ile de Marguerite, Venezuela.
YV1AFC—Box 18, Maracay, Venezuela.
5W1AU—Box 1068, Agila, West Samoa.
4J0BJ Box 83, Moscow

We have to curtail any further notes here, due to space limits, however I am now again receiving Geoff Waits DX News Sheet every week, and as this contains everything of possible interest I will probably be able to answer any queries which anybody has.

My thanks this month to VK3ASV/T, Albert Cash, Mac Hilliard, Ernie Luff and the Geoff Waits DX News Sheet, also to VK3CIP 73 de Dec. 1974.

Late DX news from VK3GL. For those needing Rao Thome on c.w. CR3AJ has received a number of additional QSLs and is reporting active daily on 14000, 14012, 14028, 14040, 14048, 14050, 14065 or 14100 kHz. He expects to be there for five years. CR3SP is keeping the a.s.b. boys content. He has been reported as getting into VK road 0830.

Juan de Nova was activated by PR4E/J for 36 hours on Nov. 12-13. There will be a change of operators shortly from the Kerguelen station FB3XC. They will be FBAPQ and FB3PS. FBMD will remain as QSL manager, if you still need Guad Republic keep a close look for TT8AD. He closes down from there on Dec. 15 c.w. activity from Gambia on 3503, 7003, 14330, 21030 and 28036 by ZD3QC until Dec. 8, QSL via OZ3PO.

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CORRESPONDENCE

(Continued from Page 19)

Editor "A.R." Dear Sir,

I have been following the correspondence in your columns about the Novice licence debate and wish to add my strong support to those Institute members and others who have sent letters in favour of this form of licence. Owing to family and business pressures I have found it too difficult to continue with the A.O.C.P. course but feel that I could manage to cope with a simpler form of training such as the Novice licence implies. I am quite willing to accept the fewer transmitting conditions that would be available to me in this situation and am certain that, over a period of Novice experience, I would be able to improve my knowledge and operating skill to the A.O.C.P. standard. Please record this letter as a pro-Novice vote.

Leon A. Sheers

Editor "A.R." Dear Sir,

I am an administration officer, stationed in a rather remote out-station in Papua, and following an interest picked up while in school, I applied for an Amateur Radio Operator's Licence, only to be confronted by an archaic system of classes and tests. Surely a Novice-type Amateur licence could be introduced that would suit people in my special situation, of which, I am sure, there are many.

My friends in Japan and the United States assure me that these simplified Novice licences

are in operation over there, and quite successfully too. Why can't these types of licences come into operation in Australia as well?

I am sure many of your readers will share my views.

Peter R. J. Turner

Editor "A.R." Dear Sir,

At the last meeting of this group all members present signed a petition to the Federal authorities of the Institute requesting that the W.I.A. might seek from the Postmaster General a third level of Amateur transmitting licence, mentioned generally as a Novice licence.

In submitting this petition we have given special thought to the value of this form of transmitting concession as a means of aiding the instruction of people wishing to enter the Amateur Radio hobby and using Amateur-band communications as a means of communication in the public interest. Our group has had experience of the need for capable radio operators under emergency conditions, especially during the 1968 bushfires in this area and we are planning ahead so that more of our members will be able to operate, install and maintain the radio equipment available to our fire-fighting unit.

Furthermore, we have noted with interest your Federal President's statement in Nov issue of "A.R." in which he stated (page 21): "In my view the Amateur Service over the next few years could face a questioning of its position and perhaps its very existence." It is clear that the Amateur Service as a whole

must be able to demonstrate the usefulness to which it puts its frequencies." We put forward the suggestion that a Novice licence used as an aid to instruction in radio communications could well help to back up your President's contention.

C. J. Hoppitt,
Captain, Nth. Springwood V.B. Comm. Group.

OBITUARY

ADRIAN B. MILLER, VK3AH

Adrian Miller, VK3AH, passed away suddenly on Sunday, 14th November, aged 54 years.

First licensed in 1937, having attended the W.I.A. classes with Bob Cunningham as instructor, Adrian remained reasonably active on all bands and retained a very active interest in all Amateur matters.

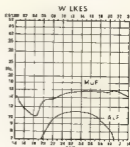
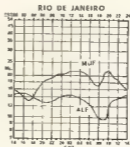
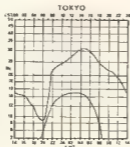
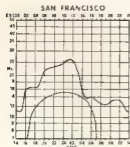
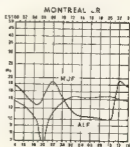
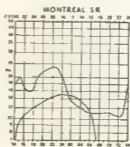
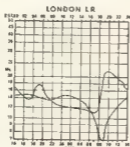
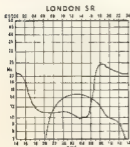
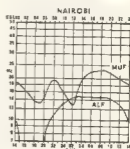
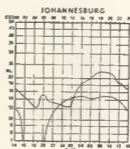
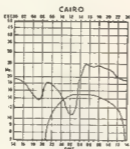
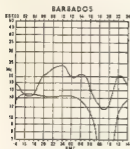
Five years' service in R.A.A.F. radar found him a Flt.-Lt. in charge of radar stations.

An accountant by profession, he was employed, from leaving school, by the Melbourne Herald-Sun organisation. He spent many years with DDB and then when T.V. started, with HSV.

Members of the W.I.A. extend their sympathy to his wife, teenage son and daughter.

PREDICTION CHARTS FOR JANUARY 1972

(Prediction Charts by courtesy of Ionospheric Prediction Service)



Sub-Edit for ERIC JAMIESON VK5LP
Forrester, South Australia, 5233.
Closing date for copy 30th of month.
Times Eastern Summer (Daylight Saving) Time.

AMATEUR BAND BEACONS

VK2	32.925	VK0MKX	Mawson
VK2	32.925	VK0VY	Macquarie Island
VK2	33.944	VK0KPF	Casey
VK2	32.920	VK0L1	Sydney
VK3	144.150	VK1VY	Wellington
VK4	144.390	VK4W1Z	Townsville
VK5	144.390	VK4VW	Near Toowoomba
VK5	33.940	VK5VE	Mt. Lofy
VK5	44.800	VK5VY	Wentworth
VK6	32.908	VK6VF	Blackey
	32.900	VK6TS	Carnarvon
	32.950	VK6VE	Mt. Barker
	144.520	VK6VE	Mt. Barker
	145.010	VK6VF	Blackey
VK7	144.900	VK7VY	Devonport
VX0	144.600	VK9X1	Christmas Island
ZL1	145.010	ZL1VHF	Auckland
ZL2	145.005	ZL2VHF	Wellington
ZL3	145.000	ZL3VHF	Christchurch
ZL4	145.000	ZL4VHF	Dunedin
JA	11.995	JA1VJ	Japan
JA	11.995	JA1KAP	Japan
HL	30.190	HL5W1	South Korea
ZK	30.000	ZK1AA	Cook Island
KH6	30.000	KH6VW	Hawaii
	50.018	KH6RU	Hawaii.

* This station operates as a manned beacon.
It is intended.

There have been two further additions to the beacon list this month. Firstly, VK4W1Z is now Townsville on 52.400 and VK6VE at Mt. Barker near Albany on 33.950 MHz. It is interesting to note that both these beacons are in operation by the time these notes are read. Eddie VK1VF mentioned during a contact a few days ago that he was using a beacon "technically advanced" for the 144 MHz. band. When further news of this one is available details will be included. No news has yet been received from the Hawaii beacon which has been consistent reports of an impending beacon. It is so seems probable a beacon will be established in the 2 metre band shortly on 144.437 MHz. The Swan's "attended operation" beacon is available through the kind assistance of Max VK2VY. The beacon will be operational at least during the DX season, further information on future operation should be forthcoming as the time comes. The beacon is very variable but it is expected to be operating some week nights and at week-ends.

The above beacon list has been maintained for a present strength for some time. It is intended to prune off the less likely beacons from the monthly listing after the next equinox period April 1972 as with the declining number the likelihood of reception of beacons from U.S.A., Hawaii, etc., will be very remote indeed. It is intended to produce, perhaps twice a year, a list which will include these plus a few others for interest, so you can keep your records up to date. The list will include the names of the Australian and New Zealand beacons, Christmas Island and Japan. It would be appreciated if those charged with the responsibility of the listing of any future beacons could give me advice of such construction as the necessary advice can be given through these columns. Any frequency changes or correction would be promptly advised to me to keep this list in "A.R." correct. I am indebted to those who have kept me informed, and for the many favourable comments I receive during QSOs on the various bands v.h.f. and h.f. regarding the listing of beacons. This regular listing seems to have provided something people have needed.

Bob VK6BE and Aub VK6XY are seeking to run the Albany area on the 11p this year. The 2 m. beacon VK6VE has from 1st Dec. been running 24 hours a day, the off season period of 0730 to 0030 daily. Considerable time has been spent in upgrading the 2 m. beacon and efforts made to have it run on 32.950 getting for the DX season. Both have expressed considerable interest in 432 MHz and efforts are being made to obtain parts for the construction of equipment for use on that band. It seems possible that if some help can be given from VK3 and VK5 to meet the power bill for the beacon set-up at Albany, a 432 MHz. beacon could be considered feasible. But as a small group costs per rate are high, and it seems those most to join in VK3 and VK5 should be prepared to help in some way. Leigh VK6WA in

Perth beams to VK3 and VK5 at 2330 on Tuesdays, Thursdays, Saturdays and Sundays on 144.600 and 144.900 and contact times and conditions are suitable, s.s.b. is available. Leigh usually spends five minutes calling, after which he listens.

While on the subject of people calling, David ZL4FG will be operating portable from a point 5,000 feet a.s.l. 40 miles west of Dunedin on 52.400 every 22. Field Day and VK3 Field Day is running 100 watts a.m. Additionally, at week-ends David will beam VK from his home with a 5 element yagi between 600 and 1130, same frequency and antenna. Also he has available 50 watts of s.s.b. 31.0 to 31.5 MHz, and 144.0 to 144.5 MHz. He runs 10w, of a.m. on 2 m. as well as 3w s.s.b. on 432 MHz. A guy worth keeping in mind, particularly as he represents that elusive fourth district.

From George VK3ASV comes some news of the activities of the club (Clubhouse District). V.h.f. Group, who have been very busy during the winter months upgrading their equipment, and using the Latrobe Valley repeater (VK3VY/R3) to swap ideas. In addition, Channel B was quite active, at times Channel C had to take the overflow! More than 50 km. operators in that area at present. The "one-up" crossband experimental repeater with an input on 147.80 and output 432.30, new idea has been successfully using the Latrobe Valley to Melbourne. The current zone s.s.b./a.m. calling frequency is 32.100 and appears to be increasing in popularity.

George also advises that during the DX season the Eastern Zone 2 m. beacon should be operating experimentally from the Latrobe Valley floor station on 32.100 MHz. The call sign will probably be VK3BZZ, pending P.M.G. approval. Initial power 1 to 3w, and running 24 hours per day.

Bob VK3AOT sends along his usual interesting notes and the following is extracted therefrom: "Brian VK2BY advises that a Ch. 4 repeater, VK2VY/R3 is now operating from Barrow, a site 4,600 ft. a.s.l. with 75w output. A 2 m. beacon is also being considered for Launceston. The Devonport beacon (VK2VY) is now operating with 1w, output, but is soon to be increased to 10w, when a solid state amplifier being constructed by Brian VK2SJS is complete."

"Thursday, 11th November, was a particularly good night for 2 m. and 12 Melbourne stations worked VK2VY/R3 signals to 50 on 432 MHz. The same night signals from VK2EM were also 50, and created quite a lot of interest but unfortunately the station was unable to listen on 432 and stations had to be content to work crossband. Alan VK2ZSJ is completing the 2 m. in Melbourne."

"For the interest of many with 432 MHz gear, Alan VK2ZSJ at Deniliquin has now completed equipment for that band, and only awaits a main day to climb his 100 ft. tower to connect the 432 MHz. antenna. Alan is about 400 miles from Adelaide. Anyone interested?"

"Mike Farrell VK3II, has advised that a VK2 V.h.f. Field Day will be held over Jan. 1, 2 and 3. The only other official field day is VK3 on 24th Jan. over 3000 miles. The States usually also go out over that week-end, so possibilities of contacts over considerable distances could be available. That you can."

Six metres DX got away to a good start this season. The latter part of Nov. saw some excellent operation over most of the Continent. VK5 certainly came in for its share, 26th Nov. being a particularly outstanding day, with the band still open at midnight. States worked were VK1, VK2, 3, 4, 5, 6, 7, and 8, with many excellent signals, 50 plus from 1w. tx, etc., and

over 600 to 1,000 miles! The VK3 boys were heard to be having a ball on the f.m. net of 32.5 MHz.

It was noted a further increase in the number of stations now using s.s.b. on 8 m. and with very good signals. Quite a few operators were caught with the new technique to them of having to call on the other station's frequency because of transverse operation. Until this form of beaconing was widely used on v.h.f., operators using transceivers could include in their calling procedure that they are "operating in transverse". The station at the other end will then know it is necessary to v.t.o. on to the station calling or vainly hope the s.s.b. fellow tunes!

DAYLIGHT SAVING

With the introduction of daylight saving to Vh1, 2, 3, 4, 5 and 7 until 28 Dec., some effects will be noticed for v.h.f. operation. Contacts generally will be conducted on Eastern Standard Summer Time or GMT, so that a consistent summertime previously at 0700 will still continue to start at that time, 0700 being in summer time. Some advantages do come out of this, in effect, as far as propagation is concerned, this is dependent quite largely on temperature changes. Therefore, those in the Eastern States and VK3 have the benefit of an extra hour for 3 m. operation in the morning before signals will deteriorate, i.e. 0700 is really 0600 usage-wise time! Similarly in the afternoon for sporadic E contacts, everyone should be home an hour earlier (propagation time) and signals which often decline or disappear with the approach of sunset will be there that much longer for you to enjoy. Eastern States should remember there is now a 2-hour time difference with VK8, and 1 1/4 hours with VK5.

I note with interest from the pages of "The Victorian VHF'er" that someone even goes mobile on 144 MHz. Kevin VK2VY was heard operating mobile between Melbourne and Geelong. His tx produced 7w output when fed into a 1w antenna mounted on the starter. A FET converter and valve tunables if he used on receive.

From the same source comes advice that Wally VK2ZSJ has been appointed Director of Technical Education in Tasmania and will move to Hobart in Jan. 1972. Wally has s.s.b. gear on 8 m. 2 m. and a.m. on 432. He has also been active on 870 MHz. (VK7 gain from VK8 loss.)

COMING EVENTS

1st, 2nd and 3rd Jan.—VK3 V.h.f. Field Days.
2nd Jan.—VK3 V.h.f. Field Day.
23rd Jan.—End of Ross H.L. Memorial V.h.f. Contest.

18th and 19th Feb. John Moyle Memorial National Field Day Contest.

To conclude, several bits of information have come to my notice. Dick VK2EDN has been doing some work on 3300 MHz. North Western V.h.f. Group has been formed in VK3 up Wentworth with a view to the VK2EDN being to be the Secretary VK2K7K, running 7 watts, reported to have worked a total of 100 stations in the 2 m. band. VK2EDN believed is using 10 stacked halves for an omni-directional gain of 9 db.

That's all for this month. Something for you to think about. "Alan is also doing brilliant thinking, the machine is fast, accurate and stupid." T3, Eric VK3LP, The Voice in the Hills.

Fish on from Roger VK3ZTS. The Mawson beacon VK0MKX was heard in Sydney on Thursday/Friday, 29th/30th November.—Ed.]

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DIVISIONAL NOTES

NEW SOUTH WALES

VK2 QSL BUREAU

Inwards: Despatched by the Hunter Branch members. Please mail all incoming advice to the Hunter Branch where they require to be done with their cards. Address: P.O. Box 134, Christown, N.S.W., 2290.

Outwards: Leave at 14 Aitchison Street, Crows Nest, or send direct with money to cover enclosed cards to: Mr. T. Lackey, P.O. Box 90, Frenchs Forest, N.S.W., 1580.

An information sheet outlining the operation of the QSL Bureau is available from 14 Aitchison Street, Crows Nest, 2055. If a copy is required please enclose a stamped addressed envelope.

Enquiries of postal and other Institutes services may be obtained from the office. If a list of mail please send a s.a.e. for list. Phone enquiries will not be accepted as there has been too much confusion with these orders in the past.

The Divisional office at 14 Aitchison Street, Crows Nest, will be closed from Friday, 22 December, 1971, to Friday, 21 January, 1972, inclusive. All enquiries by mail will be dealt with as usual.

By the time these notes appear, the Divisional station VK1W1 at Dural should be on the air with a Sunday morning broadcast of 145.3 MHz. The station will be on 40 and 80 metres. On v.h.f. 35.25 MHz, 59.86 MHz, 145.3 MHz and Channel 4 145.9 MHz. Last transmission was recorded on 169.5 MHz, 40m and 438 f.m. In addition s.a.e. facilities will be available on h.f. A trial broadcast was conducted on 30/1/71 but there were still a few gremlins in the new h.f. transmitters.

Members submitting information for "A.R." are reminded to have their information relevant to the month in which it is submitted.

Clubs are requested to advise the Secretary of their meeting dates, field days, etc., for the monthly publication so that we can include this information in "A.R."

Trading post items are being accepted by this Division. Submissions should be sent to the Editor. Please refer to statement, elsewhere in this issue, relating to Hamads.

Members are reminded that the Annual general meeting will be held on 14 March, 1972. A new Council is to be elected at this meeting and the closing date for nominations is 30th March. Further details will be published in "A.R."

Further details and the layout of nomination forms will be included in Feb. "A.R."

CLUB NET

A hook-up is held between officials of clubs and the Division on 119 MHz, 1000 EST. This is to enable the exchange of information rather than a ragchew.

The frequency for the Divisional call-backs has been changed from 7050 kHz. (now a national calling frequency) to 7145 kHz. For the 1972 net pre-broadcast calls will be made on 7050 kHz.

CLUB NEWS

The Canberra Radio Society held its annual general meeting on 19th Nov. 1971, and the following members were elected: Reg VK1JMP, President; Alan VK1JKA, Vice-President; VK1JL, Vice-President; and Gary VK1GZ, Treasurer; Committee: Graeme VK1CQ, Wally VK1CQ, Peter VK1CQ, and Peter VK1CQ. Paul VK1ZPB, Eric VK1CQ, Ron VK1ZRH and Eddie VK1VP.

VICTORIA

This month many of us are on holidays and will be travelling in this State. The National Parks are very interesting places to visit and you can gain an award for contacts made either to or from a National Park.

The Victorian National Parks award is divided into two sections. Stations may claim an award for working from a minimum of 15 of the State's 23 National Parks. There is also an award for working stations operating from National Parks.

National Parks are located in all parts of the State and usually preserve some local scenery and the local flora and fauna. The locations of most parks are marked on the maps available from the major mapmakers. Most parks have good access roads and some have a picnic area. A ranger is usually in attendance to assist you to find your way around and see the park's attractions.—VK3AUJ.

EASTERN ZONE

The Eastern Zone held their second Zone general meeting since their re-organisation last May, at Traralgon on 30th Oct. Peter VK3IAIO, representing the lower class licensing proposal sub-committee (Now the licensing committee) gave the recommendations and proposals to the Federal Executive Novice Committee's meeting the following day in Sydney. The next Eastern Zone Convention will be held early in March, possibly at Moomarra or Licola. An activities group was formed to organise future field days, scrambles, 50m nights, a supper dance and possibly a regular zone annual dinner. The co-ordinator of this group will be Peter VK3IAIO. The Eastern Zone will participate in the National Field Day using h.f. and v.h.f. on Mt. Kosciusko if the weather is favourable. David VK3ESJ outlined the zone h.f. "Wildcat Award" and it will now be also available for v.h.f. operators outside the zone. For further information write to the Zone Secretary, VKEZB, P.O. Box 175, Maffra, 3890, or any zone v.h.f. operator.

The Secretary reported that the Insurance has been approved and that the Latrobe Valley Transmitter Club will move the L.V. Repeater VK3IWR/83 to Mt. Tassie. Brian VK3BBB was reported as the V.L.A. representative and the sale of their station will be made available at zone meetings and conventions, the A.O.L.C.P. classes and at the Latrobe Valley Electronics Club. The Eastern Zone will also use an Education Fund to promote Amateur Radio in Gippsland, assisting with future classes. At the monthly class meeting at Warragul (VK3UGU), Traralgon (VK3BBB and VK3IEV), and Sale (VK3AKM and VK3KCR). Visiting Technician Bill VK3EAB, who was staying at Dumbuck, now has moved to Mirboo North.—VK3ASV.

SOUTH AUSTRALIA

The swap and shoo afternoon on Sunday, 14th Nov. organised by Peter VK3QGO and his wife, had a very successful outcome. VK3SNE was a great success with another undoubtedly on the way. The rather cool November day was made more enjoyable with ice cream at the v.h.f. group picnic on 21st Nov. to last all day, so assisting to make the day a success.

A special meeting of the V.h.f. Group decided that in view of the clash of frequencies between the 145.3 MHz repeater and the Channel 4 repeater, and that the whole allocation of repeater frequencies below 146 MHz. could cause similar difficulties with repeater packages limited to 146 MHz allocation of 148 MHz. down, recommend changing repeater frequencies to a separation of 800 MHz., but retaining the mobile transmit frequencies of 146.1 to 146.4 MHz. and changing receive frequencies to 146.7 to 147.0 MHz. The V.h.f. Group feels that this change at this time will be small compared to future costs and that satellite work is the greatest public relations error Amateur Radio has ever had. The V.h.f. Group invites comment.

The November Divisional meeting heard a most interesting lecture from Al Smythe, VK3MB, on the subject of "The Future of Amateur Radio". There may well be many strange signals on 14 MHz. quite soon. The January meeting is the delayed lecture by John VK3AV on telephony and S.S.T. The February meeting is the A.G.M.

The V.h.f. Group January meeting will probably be on 14th Feb. The Saturday afternoon and evening, the 8th. The Feb. meeting is the A.G.M.—Bart VK3GZ.

CALENDAR

EVENTS AND CONTESTS

- 2 Jan.—VK2: V.h.f. Field Day: 12-hour period, runs as per Ross H.U. distance scoring table.
- 3 Jan.—VK3: V.h.f. Field Day.
- 8 Jan.—VK5: V.h.f. Barbecue.
- 12 Jan.—VK2: St. George Am. Rad. Society.
- 12/13 Jan.—ZL: V.h.f. Field Day.
- Jan.—23.59 hours Z.A.S.T.—end of Ross H.U. Memorial Contest. Starts 1972/73.
- 25 Jan.—VK5 and VK6 General Meeting.
- 28 Jan.—VK2 Divisional General Meeting.
- 28/30 Jan.—"CQ" W.W. 160 m CW Contest, and French CW Contest.
- 3 Feb.—VK5 V.h.f. A.G.M.
- 4 Feb.—VK2: V.h.f. Group meeting; Gosford;
- 5/6 Feb.—A.R.R.L. Phone DX Contest.
- 9 Feb.—VK3 St. George Am. Rad. Society.
- 12/13 Feb.—National Field Day Contest, 1972 (refer Nov. "A.E." p. 13), also ZL v.h.f. Field Day.

"A.R." HAMADS

The following re-organisation relating to "Hamads" in "Amateur Radio" has been agreed to by the Victorian Division and also on behalf of Federal Executive. This agreement, which is based on the present section, is in the format of the column in "A.R." and may require revision in the light of further experience.

With effect from the February issue of "A.R.", "Hamads" will be printed free of charge for members. The number of Hamads per month, limitations and conditions are not. The maximum space allowance for a free insertion will be 20 words, printed in 10 point font. The number of Hamads per month will be taken to contain not more than 200 characters, spaces, which is equivalent approximately to 20 words of five letters each separated by one space. This free allowance will be inclusive of name and address but will exclude the nature of the requirement (e.g. "For Sale", "Wanted", and the first word in the Hamad specifying the place where the goods or services are located or are needed (this first word is the name of the city or town). In order to save words, the expression "QTH" may be used to mean that the advertiser's name and address are correct in the current issue. The advertiser's name and address in Australian Call Book. The advertiser might conclude as follows: "VK7ZZZ QTH Ph. 13456".

The telephone number obviously would be the home QTH and the city (town or suburb) would be as listed by the first word of the Hamad.

If any "Hamad" exceeds the maximum free allowance, it will be charged at \$6 per column inch. The advertiser will be charged. The minimum charge will be \$6 per column inch. Additional column inch or part thereof will be charged at \$6 per column inch. The advertiser must be prepaid. The advertiser must be to be 12 lines each of approximately 30 characters/lines.

Hamads is a service restricted to members of the Institute unless prior arrangements are made with the Editor if exceptional reasons exist, e.g. deceased's effects. Reports Hamads will carry the full rate of \$6 per column inch irrespective of whether or not the advertiser is a member. If a Hamad is published in the current issue of "A.R.", the copy should reach the Editor on or before the third day of the preceding month. If the advertiser requires a Hamad unless specially requested and no correspondence can be entered into concerning Hamads.

It is regretted that it is not possible to comply with any instructions requesting bold type or any non-standard display or typographical arrangement. It is also regretted that no guarantee can be given that any advertisement in respect of any errors or omissions or concerning any goods or services on offer and no guarantee can be given that any advertisement as submitted will be published at all or in any particular issue although, naturally, every effort will be made to meet the wishes of advertisers.

Each Hamad should preferably be in typewriter, double-spaced on one side of the paper and must be signed by the member submitting with a reference to his membership number. The Editor reserves his right to edit all material submitted for publication. The Editor's decision in "Amateur Radio" but quite obviously these powers are very seldom required in normal circumstances.

Any Hamad which is deemed to be of a commercial nature will be subject to rejection even if submitted by a member and no Hamads of a commercial nature will be accepted. The Editor will be accepted except by prior agreement with the Editor. It is to be observed that any Hamad rejected on these grounds or for other reasons may, subject to the Editor's decision in relation to suitability, be accepted for publication in "Amateur Radio" as a normal "commercial" advertisement.

—P. B. Dodd, Federal Manager.

SERVICE TO MEMBERS MAGAZINES AND BOOKS BEGIN 1972 WITH UP-TO-DATE REFERENCE INFORMATION

Write for details to your Division or to Federal Executive, P.O. Box 67, East Melbourne, Vic., 3002.

INTRUDER WATCH REPORT

Because of Intruder Watch vigilance the spurious transmission on 1430 kHz from the B.B.C. relay at Johore in Malaysia has been cured, and is no longer heard. Your Federal Co-ordinating is keeping in close liaison with the Radio Branch, so keep those reports coming in.

The following is an extract from a letter received from a VK8, I quote:—

"There is a ruffian on c.w. on the 14 MHz. band. He is very strong day and night time. His tx was very full ... about 50 kHz. wide. I think he was keying the mains! Managed to QRM him down below 14000 at one stage, but he came back up again. At one time he got really hostile, abused me and TOLD ME TO GET OFF THE BAND!! I just kept on calling 'CQ' as if nothing happened. Also had a ring from the RI re key clix reported by a VK4 Amateur who blamed me for his key clix."

Further ideas reference this matter appear in a "Letter to the Editor" in this issue.

—Alf VK3LC, Intruder Watch Co-ord., W.I.A.

WIRELESS INSTITUTE OF AUST.

VICTORIAN DIVISION

A.O.C.P. CLASSES

Classes in theory and Morse will commence respectively on Tuesday, 15th February, 1972, and Thursday, 17th February, 1972, from 8 p.m. to 10 p.m. Subject to demand, a Saturday morning class in theory is also proposed.

Persons desirous of being enrolled should communicate with the Secretary, W.I.A., Vic. Division, P.O. Box 36, East Melbourne, Vic., 3002. Phone 41-3535 10 a.m. to 3 p.m.

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- Microphones and Microphone Transformers.
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SILENT KEY

It is with deep regret that we record the passing of—

VK3AH—A. H. Miller

COOK BI-CENTENARY AWARD

The following additional stations have qualified for the Award:

Cert. No.	Call No.	Cert. No.	Call No.	Cert. No.	Call No.
1414	AX6MA	1422	AX1AN	1430	AX3BD
1445	DXKPS	1423	1ITQ	1431	WQJBL
1416	ZS6HJ	1434	1IIR	1432	AX4LV
1417	1IPIK	1455	AXVVC	1433	AX5OH
1418	YB1BM	1426	H8BMO	1434	VE3ON
1419	SM2DR	1427	XW6CN	1435	VE3EWE
1420	EA1DM	1428	W2NR	1436	AX5AV
1421	G1GXG	1429	MI3AF	1437	KRLKA

V.I.F./U.R.F. SECTION

Cert. No. Call

29 AX4ZF3

30 AX4ZTL

KEY SECTION

The Key Section is now seeking members. The full rules were published in November "A.R." but in brief: 50 c.w. contacts lasting at least 15 minutes, which must include 35 contacts with other VK stations, are required. Write to Federal Manager, Key Section, P.O. Box 67, East Melbourne, Vic.

If you troubled to read the rules of the 1971-72 Ross Hull Contest in October "A.R." you will have observed that a c.w. section is provided. This was re-instated at the request of the Key Section; it had been deleted through lack of support. The majority of c.w. operators are not interested in v.h.f. operating, but there are sound reasons for expecting c.w. to give advantages over other modes on these bands as well as on h.f. If you have v.h.f. gear, why not dust it down, install a key socket, and give the contest a bit of support.

There is a postal vote out to Divisions to provide a multiplier for c.w. contacts in the R.D. Contest. I have not heard the result yet. There was not enough time to alter the rules of the 1972 N.F.D. to provide a similar incentive for c.w. operation; this should be fixed for the 1973 N.F.D. however.

I am overseas until the end of March, so there will be a lack of topical items for a couple of months in this column. The processing of membership applications will go on, though, so do not let me stop you applying! 75, Deane VK3XZ.

RECIPROCAL LICENSING—

SWEDEN

The "Worldradio" issue of 25th October contains details of the rules applicable to foreign nationals in or visiting Sweden. An application form, at printer's cost, is required to be submitted through certain channels to the Central Administration of Swedish Telecommunications, Radio Development Section, to reach them at least TWO months before the license is required. Other requirements include a certificate of good conduct. No fee is payable for periods up to 60 days, after that the fee is a quarter of the regular annual fee (of 40 SK Kroner) for each three-month period.

SUNSPOT NUMBERS

By courtesy of the Swiss Fed. Observatory, Zurich, the monthly predicted monthly Jan. 37, Feb. 45, Mar. 43, Apr. 42. Smoothed mean for April 1971 68.6. Provisional numbers for 1971 ranged from 17 on the 15th to 87 on the 25th.

CHANGE OF ADDRESS

Ionospheric Prediction Service is now at:
162-168 Goulburn St., Darlinghurst,
N.S.W., 2010

See letter Dec. "A.R." page 15

HAMADS

Minimum \$1 for forty words
Extra words, 3 cents each

HAMADS WILL NOT BE PUBLISHED UNLESS
ACCOMPANIED BY REMITTANCE

Advertisements under this heading will be accepted only from Amateurs and S.W.'s. The Publishers reserve the right to reject any advertising which, in their opinion, is of a commercial nature. Copy must be received at P.O. 36, East Melbourne, Vic., 3002, by 3rd of the month and remittance must accompany the advertisement.

FOR SALE: FT-DX-400, new, never used, \$450 O.N.O. VK2ZYH, DCQND, 38 Engadine Ave., Engadine, N.S.W., 2233. Phone 520-3325 after hours, week ends.

FOR SALE: Heathkit HW324 Transceiver, complete with power supply/speaker unit, manual, and pair spare final tubes. Excellent working order, \$120. VK4UC, 104 Camp St., Toowoomba, Qld., 4008. Phone 71-1539.

FOR SALE: Trio TR-2E 144 MHz. Transceiver, 24w. input to 500 final, Full 144-148 MHz coverage. Separate Tx and Rx VFOs. In-built 230v, e.p. and 12v. d.c. supplies. As new, very little used, still in original carton, with mic. and d.c. leads, and instruction book. \$160 or suitable offer. Brown-Sarris, VK2ZVJ, Buronga, N.S.W.

FOR SALE: Yaesu Transceiver FT35 with VF500 VFO. Excellent condition, \$190. R. Chalmers, VK3ARQ, 6 Gatehouse St., Parkville, Vic., 3052. Phone 347-3825.

FOR SALE: 6 metre equipment: VK3 Converter, working, less crystal. £1750 Jindiville v.h.f. 18 watt a.m. transmitter, converter, less crystal and power supply. Five element yagi. The lot £38. R. Clarke, VK3BCL, 23 Glen Drive, Eaglemont, Vic. Phone 49-4246 (evenings).

RECEIVER: Star SR-500 double conversion. Ham band 6 bands. 1000 kHz. 100 kHz. 100 kHz. 2 i.f. with selective switchable from 4 kHz to 500 Hz. at 6 dB. down, \$120. Mosley TA-33U 3 element tri-band yagi, lightweight beam, \$30. C. Buckland, VK3CJL, 13 Roland Ave., Strathmore, 3041. Phone (03) 379-2623.

SIX METRE equipment for sale: (1) FM MR8 Base Station, excellent condition with crystals for 52.525 MHz. modified and operating, suit table-top, going for £24. (2) Mosley TA-33U 3 element tri-band yagi, modified and crystalized for 52.525 MHz. in good condition, also going for \$25. Contact more information from Sowers, VK2YH, 269-21443 or write to P.O. Box 551, Waggia, N.S.W., 2650.

WANTED: Band-change motors and L-R indicator drive transformers to suit 24 volt Benson M208 Radio Compass sets. Transformers are marked 115 or A15004. State price required. Vintage Radio complete with Horn Speaker, early 1920's, good price paid, send details. O'Brien, Edgar Rd., San Remo, Vic., 3955. Phone 107.

WANTED: Crystal Calibrator covering up to 250 MHz. on fundamentals with 1 MHz. spots or similar VFO. Calibrator, State specification and price to P.O. Box 57, Raymond Terrace, N.S.W., 2324.

WANTED: Johnson Matchbox, P. G. Broughton, 211 George Street, Sydney, N.S.W., 2000.

WANTED: Just starting out. I'm after a 2 metre transceiver, mobile or base, 2 or 3 mtrs. 6 mtrs. transceiver, mobile or fixed, 6 metre converter. Ring H.A.M.S. Anzac during working hours (8.30-3.30) or Tony Smith, 151/3 Slatery Place, Eastlake, N.S.W. Phone 653-7336.

WANTED: Linear Amplifier, used. Suitable to be converted to 8 m. Full 400w. p.a. output, 60 p.a.s. included. Contact P. Jackson, VK2DQY, 60 Anzac Terrace, Bassebande, W.A., 6054.

WANTED: Rotary Converter to restore R.A.N. Type 5 Synchronous Rotary Cap. Sw. Transmitter. Output 76 v.a.c. at high frequency, probably 500 Hz. Unit will probably have 24 coils, coils and can be identified by an extension shaft coming out and drive rotating gear. R. F. Fisher, VK3BAQ, 241 Royal Pde., Parkville, Vic., 3052. Phone 340-5631 (business hours).

WANTED: Yaesu FTdx400 Transceiver; other items required include Table Microphone, "Automatic" Keyer, and S.W. R.I. meter. Also, VK4SO, Mervyn Eason, Box 1513, G.P.O., Brisbane, 4001. Telephone (business) 2-2831.

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